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THE RELATIONSHIP BETWEEN CREATIVITY AND RISK TAKING IN FIFTH-GRADE CHILDREN.

PANKOVE, ETHEL
NOV47157 RUTGERS, THE STATE UNIV., NEW BRUNSWICK, N.J.

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INDIVIDUAL DIFFERENCES IN RISK TAKING WERE STUDIED IN A SAMPLE OF 162 MIDDLE-CLASS CHILDREN IN GRADE 5. MEASURES OF ANXIETY, CREATIVITY, DEFENSIVENESS, INTELLIGENCE, AND RISK TAKING WERE ANALYZED TO DETERMINE CERTAIN SELECTED RELATIONSHIPS. THE AUTHOR CONCLUDED THAT CREATIVITY BEARS A MORE POWERFUL RELATIONSHIP TO RISK TAKING THAN DOES INTELLIGENCE. (JK)

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THE RELATIONSHIP BETWEEN CREATIVITY AND RISK TAKING IN FIFTH-GRADE CHILDREN

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DEAN

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Ethel Pankove
September, 1966

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INTRODUCTION

Throughout history, thoughtful men have pondered on the elusive quality of creativity; a wealth of introspective analyses, speculations and anecdotal material exists (e.g., Hadamard, 1949; Wallas, 1926). While it is now generally recognized that creative talent is our great national asset, it is only within the past twenty years, through the pioneering efforts of Guilford (1950) and Thurstone (1950) that an attempt has been made to define creativity in terms that make empirical study possible. Since 1950 there has been a veritable explosion of interest in creativity, although the emphasis has been on studying the nature of scientific talent. In 1955, 1957, 1959, 1961, and 1962 financial grants from the National Science Foundation made possible the University of Utah National Research Conferences on the Identification of Creative Scientific Talent. The list of contributors and the variety of topics has continually become more diversified at these conferences. Indeed, included at the 1959 conference were investigators exploring the dimensions of creativity in children. Among selected significant papers from the proceedings of the three meetings (Scientific Creativity: Its Recognition and Development, 1963), we find Getzels and Jackson's exploratory work with creative adolescents and Torrance's exploratory work on creative thinking in elementary school children.

The interest in learning more about creativity in children reflects a two-fold problem - that of the needs of the individual and the demands of society. So that each individual may have the opportunity to realize his full potential development of talents as early in life as possible is required. Much psychological research suggests the importance of early special stimulation of the gifted (Harris, 1958). Rosenbloom (1958), who has worked with children gifted in mathematics, concludes that they need an education qualitatively as well as quantitatively different. Men who have been designing curricula, in mathematics and the sciences particularly, over the last several years are convinced that much more work is needed to discover how we may develop the intuitive gifts of our students from the earliest grades onwards (Bruner, 1961).

From the point of view of society, let us consider Flanagan's report (1962) on "Project Talent." A preliminary analysis of results of data collected in 1960 on a random sample of 440,000 students in grades 9-10, 11-12 reveals that we are not losing many of our students with good potential in mathematics before college, but we are losing significant numbers with high reading comprehension and potential for creative thinking. Ultimately, increasing knowledge of how creative individuals function is in the nation's best interest. Automation in the long run will replace routine tasks, thus placing even greater importance on creative ability. We need to know more about those who are willing to disturb the status quo for the sake of introducing novel ideas or products.

Creativity has been tied to national survival. R. B. Winn in his introduction to a book on Soviet psychology applied to education in the USSR points out that one idea runs through the entire series of articles: . . . "One of the principal tasks of the school, from its beginning, is to locate and promote among children talent of any creative type, for it is never too early to encourage future scientists, inventors, artists, writers, or plain workers to do their best and to learn and think unselfishly." (Soviet Psychology, p. 4). The problem of understanding the nature of creative thinking, as well as the early identification and training of creative people, appears to be international.

CHAPTER I

STATEMENT OF PROBLEM

The Problem Under Investigation

The purpose of this study is to determine whether relationships exist between creativity and risk taking in fifth-grade children. It is well known that intelligence alone cannot account for creative productivity; but it is not known to what extent certain temperamental or motivational traits associated with intellect influence creative performance. An examination of the literature leads to the belief that individual differences in the risk-taking quality of decisions may have important implications for creativity.

It is commonly thought that creative people are more willing to take risks than are less creative people (Ghiselin, 1952; Guilford, 1960; The Nature of Creative Thinking, 1952). Some of the speculations are as follows: creative adults will take greater risks in order to satisfy their desire to create (Barron, 1957, pp. 119-128). The creative person has a stronger initial impulse to render experience intelligible. Although he is under much tension during the process of attaining his goal, there is a correspondingly great pleasure on reduction of tension, therefore the motive is generated for seeking other situations which defy rational construction. The creative person does not have to be very sure; he is able to make the "unguarded leap," as it were. The ego of the creative person is sufficiently strong to allow itself to regress knowing that it can correct itself and handle whatever it undertakes. The creative individual will perform what is most challenging in view of his own aims; he is more expressive and impulsive, though not necessarily in terms of conscious insight. Barron concludes, ". . . I think always some economic law is obtaining here in the psychic life and that the creative individual is able to gauge much better how far he is able to go in perceiving disorder and permitting regression" (p. 125).

Kaplan (1960, p. 239) suggests that what seems a great risk to the average individual will not seem such a great risk to the creative individual. Referring to research scientists, Kaplan contends that they are more willing to take risks because they have greater self confidence. They have to feel that they are good enough to risk something. Bruner (1961, pp. 58-68) also thinks that self confidence is a necessary personality trait for creative people. He speaks of the need to train people not only in analytical but also in intuitive thinking. Under some conditions, the intuitive guess may provide us with a path into the unknown, but only a self confident person will make such an intuitive leap. There is greater likelihood of self confidence if the individual has been trained in a variety of thinking techniques.

The hypothesis has been advanced that creative people are better able to calculate their risks (McClelland, 1956, pp. 96-110).

McClelland speculates about the creative scientist in terms of the theory of achievement motivation. The creative individual is someone who will have higher n Achievement that predisposes him to take moderate calculated risks in which success or failure will depend on his own efforts. Risk taking must depend on skill not luck. Creative scientists, therefore, must not only be willing to take certain calculated risks but must also receive certain satisfaction out of the risk-taking enterprise.

The foregoing speculations about creativity and risk taking have been concerned with adults, particularly research scientists. A similar description can also be found of creative adolescents; they enjoy the risk and uncertainty of the unknown (Getzels and Jackson, 1962, p. 51). In contrasting the performance of highly creative and highly intelligent adolescents, Getzels and Jackson found that creative adolescents seemed to need to free themselves from customary thought and to go off in new directions. They seemed to enjoy the uncertainty of untried experiences. Their stories, drawings, and even autobiographies demonstrated that their world of fantasy contained many anxieties as well as delights. Getzels and Jackson describe these youngsters as having the courage to face their own inner world even when a daydream might be transformed into a nightmare.

While speculations are fairly numerous, however, an examination of the empirical literature reveals that the relationship between creativity and risk taking has not been systematically explored.

The Importance of the Problem

Thinking, as Bruner states, "requires the willingness to make honest mistakes in the effort to solve problems" (1961, p. 65). But it requires courage in the student to chance making errors and a sensitive teacher to distinguish a stupid mistake from an intuitive but interesting mistake based on insufficient information. Highly creative children are not worried about the possibility of error or of being misunderstood (Getzels and Jackson, 1962, 50-51). To what extent this element of risk taking is associated with creativity is our problem. The individual's production of new ideas appears to depend partly on his willingness to engage in the process of trial and error.

Torrance and Gupta (1964) observed that there is a decline in creativity at the fourth grade level and imply that, in addition to loss of talent at this time, many problems of mental health may have their origin. That this decline is man-made is evident from the fact that where teachers like creative children and reward creative achievement, no decline in creativity occurs. It has also been observed that creative children often exhibit disruptive and other socially undesirable behavior in the classroom (Getzels and Jackson, 1962; Torrance, 1963; Wallach and Kogan, 1965). Under such conditions, it seems pertinent to inquire about those personality characteristics associated with creativity which are either stifled or too narrowly channeled by present classroom practice.

While in the early elementary grades there may be room for "divergent" thinking, in the upper elementary grades the emphasis is increasingly in the direction of "convergent" thinking, the one right answer to every question. If to this pattern is added fear of venturing an answer, then the flexibility of thinking, the impulsiveness, the independence, the openness to stimuli seen in the creative child may be stultified before developing fully. It may be that the present system of classroom pressures to produce in the shortest time possible and to produce only one correct answer in every learning situation may militate against the development of creative thinking (Dentler and Mackler, 1964; Wallach and Kogan, 1965). Such training which may result in children's withdrawal from more venturesome thinking patterns could have unfortunate results for the development of creativity. Hence an investigation of our problem has important implications for present classroom practice.

We have attempted, then, to demonstrate that our particular problem is meaningful in terms of the overall importance of creativity. If a relationship does exist between creativity and risk taking in children, it may have important implications for thinking in general and for teaching methods in the elementary school. Our study will also provide us with information that may further clarify the theoretical meanings of both creativity and risk taking.

CHAPTER II

REVIEW OF THE LITERATURE

Creativity Theory and Research

Recent research and theory on creativity have concentrated on three main issues: (1) What is creativity? (2) How does creativity occur? (3) Under what conditions does creativity manifest itself? (Golann, 1964). Much has been written with emphasis either on the products of creativity, the process, measurement, or personality. (See, e.g., the detailed bibliography by Stein and Heinze, 1960). According to Spearman (1931, p. 24) his principle of correlates, "When any item and a relation to it are present to mind, then the mind can generate in itself another item so related," represents the utmost degree of creativeness to which the human mind can under any conditions possibly attain. Spearman concludes that the study of creativity and that of general psychology are at bottom the same. D. W. Taylor (1962) suggests that distinctions among problem solving, decision making, and creative thinking can be made only in terms of product; creativity is that thinking which results in the production of ideas or other products that are both novel and worthwhile. A survey of the various definitions of creativity in the literature reveals as essentials, novelty and goal direction. Idle fantasy is not enough.

Although the following five points of view on creative thinking are by no means exhaustive of the field, they do represent distinct and significant theoretical positions: (1) traditional logic, (2) classical associationism, (3) Gestalt formulations of productive thinking, (4) psychoanalytic conceptions, and (5) dynamic perception theory. The psychoanalytic conception of creative thinking appears to be the most influential current approach, perhaps because personality as related to creativity has been dealt with most comprehensively by psychoanalytically-oriented writers (e.g., Burchard, 1952). The major issues in the Freudian approach to creative activity, as well as the other four traditional theories with their varying emphases on the process of creativity, have been considered in detail by Getzels and Jackson (1962, ch. 3), hence our discussion here will be limited to those points of view most directly relevant to our study.

Classical associationism, holds that thinking is a chain of ideas, or in more recent terms, a chain of stimuli and responses, or a chain of behavior elements. The way to understand thinking is to study the laws governing the succession of ideas or behavioral items. Habit and past experience are essential factors in thinking. Production of new ideas occurs by trial and error. According to the theory of associationism, the ability to think productively is the working of associative bonds and depends on the number of associations an individual has acquired. Mednick (1962) has recently utilized the theory of associationism to interpret the process of creative thinking. He defines the creative process as "the forming of associative elements into new combinations which either meet specified requirements or are in some way useful. The more mutually remote the elements of the new combination, the more creative the process or solution" (p. 221). To be creative the product of the thinking must be useful.

The trait theory of Guilford has stimulated much empirical work. Guilford (1950) presents a general theory of creativity which is a theory of the entire personality including intelligence. Personality is viewed as a unique pattern of traits. According to this factorial conception of personality, creativity represents patterns of primary abilities, patterns which can vary with different spheres of creative activity. Each primary ability is a variable along which individuals differ in a continuous manner. Therefore, the nature of these abilities can be studied in people who are not necessarily distinguished for creative reasons. Productivity depends upon other primary traits, including interests, attitudes, and temperamental variables. "Creative acts" are the formation of new associations to meet requirements of the task (Guilford, 1951). The battery of tests devised by Guilford and his associates to measure creative thinking are still basic in the field.

The use of creativity-test scores, such as those used by Torrance (1962) and by Getzels and Jackson (1962), appears to be a useful first step in the empirical investigation of creativity because it usually provides a reliable immediate criterion. The value of such a criterion for discovering and validating predictors lies in the degree to which such devices are equivalent to other more remote or more relevant criteria of creative performance. Such test scores may be more useful in defining more explicitly the nature of adult creativity after these scores have also been employed as predictors of creative performance in longitudinal studies. Following an extensive evaluation of the field, Taylor and Holland (1962) conclude that research knowledge about creativity is still scanty and mostly exploratory in nature. There is still uncertainty about the degree to which "creativity" tests are valid predictors of important creative performance.

According to Golann (1964) what is needed is not only data at the correlational level but conceptual reorganization as well. We need a better understanding of intellect - the kinds of studies being pursued by Guilford and by Bruner. The use of theoretically derived personality factors as criterion variables has been neglected yet holds promise of providing a functional developmental understanding of creativity.

Creativity and Personality

Thurstone (1950) had considered as a possible working hypothesis the idea that creative talent is in large part determined by the temperamental characteristics that are associated with intellect. And Guilford (1950), in his presidential address to the American Psychological Association, had suggested that whether an individual who has the requisite qualities will actually produce results of a creative nature will depend upon his motivational and temperamental traits.

In the majority of single test studies of creative persons, there has been a consistent emergence of a sizeable number of personality traits relevant to creativity. In a study of some relationships between originality and style of personality, Barron (1954, 1955, 1957) found originality positively related to impulsivity and daring. But, while significantly different from zero, the relationships were of a low order of magnitude. Barron also found creative adults skeptical, expressive, rebellious, disorderly, and independent. Characteristics similar to the foregoing ones have been described by Getzels and Jackson (1962) in their study of creative adolescents as compared with those of high intelligence. Creative adolescents also expressed more aggression and violence in their drawings and stories. Impulsiveness as a component of the creative personality has also been found by Merrifield _et al_ (1961) and Rees and Goldman (1961) for young men, and Getzels and Jackson (1962) for adolescents. In creative children Torrance (1963a) found more primitive behavior in general with the result that their peers tended to isolate them in the classroom situation. Disruptive, attention-seeking behavior among girls of high creativity was found in fifth-grade children by Wallach and Kogan (1965).

The trait of independence associated with creativity has been cited by other investigators in addition to Barron. Anne Roe (1952, 1960), in her studies of the development of creative scientists, described as salient among their characteristics strong curiosity, persistence, high energy level, and a strong need for independence. MacKinnon (1962), in a study of the personality characteristics of creative architects as compared to those of less creative architects, found that the most creative were significantly more independent in thought and action, had a high energy level and a freedom from petty restraints and impoverishing inhibitions.

Sensitivity and greater openness to stimuli both internal and external is a characteristic of creative individuals commonly agreed upon by a number of investigators (Cattell, 1960; Getzels and Jackson, 1962; MacKinnon, 1962; Schachtel, 1959; Stein and Meer, 1954; Torrance and Gupta, 1964; Wallach and Kogan, 1965). When confronted with an ambiguous stimulus, for example, the creative individual shows greater flexibility and freedom in developing his responses. He shows a willingness to risk the possibility of error or of being misunderstood. Perception is a function of the perceiver, his needs, defense mechanisms, and integration as well as the characteristics of the stimulus field. The creative individual under ambiguous conditions appears to have more inner resources to draw upon than his non-creative counterpart. Thus the creative individual will freely structure tasks in their own terms.

While there have been many speculations on possible relationships between creativity and neurosis, the empirical evidence shows no basis for a relationship between maladjustment and creativity (Cattell, 1960; Drevdahl, 1956; Merrifield et al, 1961; Rees and Goldman, 1961; Wallach and Kogan, 1965). Cattell emphasized that a common clinical mistake is made of confusing high anxiety with a neurotic personality structure although recently there have been test distinctions made between anxiety and neurosis. There are innumerable instances in biography of a high anxiety level in productive researchers. Cattell stresses this fact as one more bit of evidence that researchers are simply more sensitive emotionally. Rees and Goldman (1961) explored the relationship between creativity and certain personality factors in 68 students, using the Guilford-Zimmerman Temperament Survey and the Minnesota Multiphasic Personality Inventory. Creativity was determined by a self-report questionnaire. The most creative group scored significantly lower on factors of Restraint and Friendliness and higher on Ascendancy on GZTS variables; they were also significantly higher on the Hysteria scale. They concluded, however, that there was no support for a relationship between maladjustment and creativity. In a study of college arts and science students rated on creativity by faculty members, Drevdahl (1956) found no significant differences between creative and non-creative groups on anxious insecurity vs. self confidence, will control and stability, or nervous tension.

In a study of 48 seventh-graders Reid, King, and Wickwire (1959) with the use of the IPAT Junior Personality Quiz (JPQ) found a significant difference between creative and non-creative subjects on Cyclothymia vs. Schizothymia, with the creative group more Cyclothymic (sociable, easy-going, and warmhearted). As measured by the McCandless Anxiety Scale, the creative children were found to be less anxious than the non-creative. While Getzels and Jackson (1962) found the creative adolescent fanciful and humorous, they also noted that the highly creative adolescent shares with the highly moral individual the general posture of the outsider, the rejected and rejecting spectator, as against the welcome and committed participant. The differences found in the foregoing two studies may be due to the procedures used to define the creative individual. In the Reid, King, and Wickwire study, the creatives were selected by nomination of their peers, while in the Getzels and Jackson study the creatives were selected by a creativity battery consisting of five measures: Word Association, Uses, Hidden Shapes, Fables, and Make-up Problems.

In the Wallach and Kogan study (1965) where creative youngsters were divided into two groups, high creativity - high intelligence and high creativity - low intelligence, there were definite personality differences between these two creativity groups: e.g., the girls in the high creativity - high intelligence group showed the highest level of self-confidence; they were sought out by their peers more eagerly than was any other group; this high intelligence - high creativity group also sought the companionship of others more actively than did any other group. In contrast, the group high in creativity but low in intelligence was the most cautious and hesitant of all the groups, the least confident and least self-assured, the least sought after by their peers as companions, and in turn were quite likely to avoid the companionship of others. Torrance (1963a) had also observed that those high on creativity and lower on IQ tend to be least accessible psychologically. Using standard materials for assessing manifest anxiety and test anxiety, derived from the work of Sarason et al, Wallach and Kogan found that anxiety was at an intermediate level for their two groups high in creativity, regardless of intelligence level.

The relevant studies of creativity in adults which we have discussed have been limited to men. Investigators, suspecting possible sex differences in creativity, have selected only male population samples. To some extent, however, investigators of creativity in children have given more attention to the question of sex differences in creativity. In their study of adolescents, Getzels and Jackson (1962) anticipated that the absolute level of creative abilities might be different for boys and girls and for the several age grades in their sample, so they established separate scoring norms by age and sex to assure a relatively equal distribution of boys and girls and of age levels in their experimental groups. But their high creativity experimental group, finally, was a combined group of 15 boys and 11 girls. Getzels and Jackson who found a greater number of creative boys at each age level speculate that lower creativity in girls may be caused by their early molding into patterns of femininity which emphasize a narrowing scope of interests and docility. Anne Roe in her study of creative scientists also felt that cultural factors detracted from scientific creativity on the part of girls. Torrance (1963a) found an increasing difference with age in manipulativeness between boys and girls. Therefore, he thinks manipulativeness may be one of the skills that contribute to greater creativeness in boys.

On the other hand, Wallach and Kogan (1965) who made a careful breakdown of groups on creativity, intelligence, and sex found that for eight of the ten creativity measures in their study the means for males and females were highly similar.

A significant study by Merrifield, Guilford, Christensen and Frick (1961) was concerned with the extent to which measures of certain intellectual factors or primary abilities can be accounted for in terms of factors or primary traits of needs, interests, and temperament as they relate to creative performance. The experimental variables were scores from short inventory instruments measuring 24 traits of needs, interests, and temperamental qualities and scores from composites of tests of thirteen aptitude factors. The subjects were three samples of about 200 each of young men who were entering military training for assignments at officer levels in the Navy, Air Force and Coast Guard. In general most of the intercorrelations were close to zero. Although the proportion of correlations considered statistically significant was in excess of chance, none was higher than about .3. The indications are that individuals who make higher scores for ideational fluency are more impulsive, self-confident, ascendant, more appreciative of originality, and are somewhat less inclined toward neuroticism. Those who make higher scores for originality tend to be more interested in esthetic expression, in reflective thinking, to be more tolerant of ambiguity and feel less need for discipline and for meticulousness. Other results suggest that individuals high on scores for associational fluency tend to be tolerant of ambiguity and to like risk taking or adventure. Those high on expressional fluency tend to be impulsive and to like meditative thinking and esthetic expression. Verbal comprehension shows the most relationships with non-aptitude traits. Those who are higher in verbal intelligence tend to be more tolerant of ambiguity and more interested in esthetic traits. The results do not support the general notion that creative people are likely to be moral non-conformists. The authors conclude that a general survey of the correlations gives the striking impression that there is very little relationship between traits of temperament and interest and performance in tests of creative thinking - fluency, flexibility, and originality. However, there is a special relation of the flexibility factors to perseveration and persistence.

> Taking the correlation coefficients at their face values, we may say that in a highly intelligent non-pathological population not more than 6% of the variance of performance on a test of fluency or originality such as was used in the present investigation can be accounted for on the basis of any one non-aptitude-trait score (p. 71).

Under the usual testing conditions, none of the creative thinking activities appears to be even substantially accounted for in terms of temperament of motivation.

Creativity and Intelligence

A further question has continued to puzzle investigators: Is there a valid distinction between a cognitive function labeled "creativity" and the traditional concept of general intelligence?

Thorndike (1963) in an analysis of the data of Getzels and Jackson and of Guilford and his associates concludes that the data suggest that "there is some reality to a broad domain, distinct from the domain of the conventional intelligence test to which the designation of 'divergent thinking' or 'creative thinking' might be applied." But it is a more nebulous and loosely formed domain than that of conventional intellect. If this is true, he continues, "Different creativity measures will be less equivalent and interchangeable than different intelligence measures" (pp. 52, 54).

In a penetrating analysis, Wallach and Kogan (1965) show that the creativity instruments used heretofore do not necessarily measure a cognitive dimension distinct from IQ; their creativity battery, designed to test Mednick's associative theory of creativity, does appear to isolate such a cognitive dimension. This dimension of creativity concerns a child's ability to generate unique and plentiful associates in a playful context free of the pressure of time limits and test ambiance prevailing when other investigators use creativity measures. While many creativity measures used by researchers (e.g., Torrance, Getzels and Jackson, Wallach and Kogan) derive from the battery of tests developed by Guilford and his associates (see Guilford, 1951), the major innovation by Wallach and Kogan involves the nature of the assessment situation, the allowance of unlimited time in a relaxed atmosphere for each subject. Dentler and Mackler (1964) using Torrance's Tin Can Uses Test for originality found greater mean originality produced by subjects in their "Safe" group as compared to those in "Routine," "Indifferent" and "Unsafe" groups, despite the rigid five-minute limitation in Torrance's test. They conclude that a warm relationship between the innovator and the recognizer increases the number of original solutions produced. However, on statistical grounds, they are critical of nine creativity measures adapted for subsequent experimentation from Getzels and Jackson, Guilford, and Torrance.

In the Getzels and Jackson (1962) study, their five creativity tasks correlated with each other on the order of .3 and also correlated with intelligence on the order of .3. There was no evidence, therefore, for describing creativity and intelligence as concepts at the same level of abstraction. The creativity tasks, despite their variety, appeared to measure nothing in common that was distinct from general intelligence. In contrast, the creativity measures of Wallach and Kogan, correlated with each other on the order of .5; the intelligence measures they used also correlated on the order of .5. But the average correlation between the two sets of measures was .1. From these measurements, Wallach and Kogan conclude that a dimension of individual differences independent of general intelligence does in fact exist. To study creativity effectively one needs to know whether it is present in a context of high or low intelligence. One must consider a child's joint standing on both dimensions. This dimension of creativity is of great interest for two reasons: first, some of the creativity procedures call upon verbal facility, a basic element of the general intelligence concept; second, this independent dimension was found in fifth-grade children among whom one might expect less differentiation in cognitive functioning than among adults.

The foregoing results are in agreement with Merrifield, Guilford, and Gershon (1963) who found at the sixth-grade level in a sample of 403 children, evenly divided as to sex, abilities in the area of divergent thinking with semantic content. These newly demonstrated factors were for the most part distinct from the factors characteristic of academic aptitude and achievement. For example, Factor DMT Originality consisted of Names for Stories, What Would Happen, Ways to Use It, Pencil-shift, Possible Jobs. These findings support the general contention that current measures of mental age are at best a small sample of the dimension of individual differences in children.

Theory and Research on Risk Taking

It has been observed that, in general, people vary in having a risky or cautious decision-making style. Cronbach (1946) describes the tendency to gamble, "Caution" vs. "Incaution," as being distributed over a continuum, from the student who answers only when very sure to the one who attempts everything. Although the construct of risk taking has been found useful for heuristic purposes, a great deal of controversy has surrounded the use of this term. There has been a steadily increasing number of theoretical and experimental articles concerned with the nature of risk taking and with the relation of individual differences in risk taking to other psychological variables. The work of economists on risk taking -- their concern with how people make a choice under conditions of risk -- has stimulated much interest in psychology; e.g., Bruner, Goodnow, and Austin (1956) in their analysis of concept formation in decision-making terms decide that risk taking is an important determinant. They suggest that any decision about how one would solve a problem has a characteristic risk feature; one must make a choice between alternatives.

In a brief evaluation of the various general mathematical models of risk taking, Kogan and Wallach conclude that the record of the model builders has not been particularly good.

> Though striving toward a comprehensive mathematical theory of decision making, they have not yet succeeded in adequately accounting even for the circumscribed subset of decisions that constitutes the domain of human gambling behavior. Could it be possible that any general decision-making model will meet with no more than limited success, if it chooses to ignore the variety of motivational, situational, and social factors that enter into the decision-making process? (1967, p. 14)

There are three types of experimental evidence relevant to the conception of risk taking (RT) as a behavioral tendency: (1) Evidence comes from studies attempting to correlate RT indices with other personality traits; e.g., two variables, need for achievement and masculinity-femininity, have been studied in this manner. (2) Evidence comes from comparing RT measures with independent "risk relevant" behaviors such as the amount of risk in one's own vocation.

And (3) evidence is gained by comparing each instrument with other RT measures in an attempt to establish convergent validity (Slovic, 1964). "Willingness to sustain indecision," according to Bruner *et al* (1956), appears to be a relatively consistent trait. Certainly individual differences in venturesomeness with respect to the use of cues does exist. "The speed with which one person will pigeonhole another on the basis of slender cues - this is one of the most characteristic aspects of man's general cognitive style . . ." (p. 230).

Yet studies supposedly measuring the same general personality disposition of risk taking reveal a considerable lack of agreement. Slovic believes the lack of consistency among risk taking measures is due to the multidimensional nature of risk taking behavior which also has subjective components that can be influenced by motivational and other dynamic systems; e.g., lack of adequate risk arousal could result in behavior which is unrepresentative of the responses which the individual would make under more motivating conditions. Kogan and Wallach (1964) suggest that the lack of success psychologists have had in finding direct personality correlates of risk taking behavior could be a result of neglecting relevant moderators. Certain personality variables may not influence behavior until they are influenced by a particular pattern of motivational dynamics. On the whole little is yet known about risk taking and about its possible implications for thinking. Risk and conservatism may be important in thinking, however, because of the fact that many forms of psychological activity that we customarily call "thinking" eventuate in some kind of decision making. Decision making, in turn, involves the weighing of alternatives. Hence, issues concerning the avoidance or acceptance of risks in making decisions are likely to be important ingredients in the thinking process.

We have pointed out that risk can be conceptualized in a number of ways. Psychologically speaking, the basic question is kind of risk, not amount of risk (Bruner, Goodnow, and Austin, 1956). In this study we shall be dealing with risk-taking measures based on decision-making tasks in which the subject is free to choose the degree of risk under which he prefers to operate. In these decision-making tasks, there is the element of risk because the subject implicitly must assess the probabilities of success and failures and their corresponding utilities in maing a choice. For example, among our decision-making tasks there will be a shuffleboard game that provides a measure of risk in a skill strategy, as well as a measure of subjective probability. To make a rational decision one must estimate at least two types of quantity, namely, the relative probabilities of different outcomes or alternative courses of action and the degree of preference for the different outcomes. The three risk taking procedures in this study fall into the general category of "decision making under conditions of uncertainty. (For a more detailed analysis of risk and decision-making under uncertainty, see Luce and Raiffa, 1957, ch. 1, 2, 4, 13).

Risk Taking and Personality

There have been a number of studies exploring relationships between risk taking and n Achievement (motivation). Atkinson (1957) offered a theoretical model relating need achievement and fear of failure (test anxiety) to risk taking in skill tasks. He concluded that when the motive to approach success was stronger than the motive to avoid failure, tasks with intermediate probabilities of success would be preferred; but when the motive to avoid failure was stronger, intermediate risk would be avoided and tasks with very high or very low probabilities of success would be preferred.

McClelland (1958), in a study of the relationship of n Achievement (motivation) to risk taking in kindergarten and third grade children found that in both groups of subjects, those with high n Achievement tended to take moderate risks while those with low n Achievement preferred significantly more often either very safe or very speculative enterprises. There were two groups of subjects -- 26 five-year-olds and 32 eight- and nine-year-olds equally divided as to sex. To measure risk taking McClelland used Ring Toss, Dot Connection, and Word Memory. Individual administration of Ring Toss gave the most statisfactory measure of risk. The higher the subject's n Achievement score, the closer he tended to approximate in his risk taking the central tendency of the successful throws. Individual differences in both n Achievement and risk taking have already appeared by age five though they are more pronounced by age nine.

McClelland speculates as to why his subjects with high n Achievement prefer moderate risks. At the safe end of the continuum, they may take somewhat longer risks than the lows either because their confidence in their own ability is such that the subjective probability of success is increased over what it actually is or because their higher achievement drive would not be sufficiently rewarded by such an easy success, or both. At the speculative end of the continuum, they may reject some of the more extreme risks taken by the "lows" either because failure is more painful to them with their higher achievement drive or because they may be able to take very little personal credit for success if it comes in such a lucky enterprise, or both.

McClelland's finding that children with high n Achievement take moderate risks has been replicated in the U. S. for college students by Atkinson and Litwin (1960) for a ring toss game; by Atkinson, Bastion, Earl, and Litwin for a shuffleboard game, and by Litwin again (1960) for a ring toss game, for pitching pennies into different sized holes, and for pencil maze puzzles of varying degrees of difficulty. An attempt was made by McClelland (1961) to check these findings cross-culturally in Germany, Brazil, and India. Correlations were in the predicted direction in all three countries but reached significance only in Brazil. Individuals with high n Achievement preferred moderate risks in a situation where the skill of the actor is involved; in betting situations where the outcome depends on luck, the results were not so clearcut. In games of pure chance, they preferred the safest odds they could get (McClelland, 1961; Atkinson, 1958). The terms "risk taking" and "goal setting behavior" are used interchangeably by Atkinson and his colleagues.

Brody (1963) made a study concerned with the effects of n Achievement and Test Anxiety on risk taking and subjective probability of success in a sequential decision task. The principal findings were: subjects who scored high on n Achievement and low on Test Anxiety tended to make their decisions in the intermediate quartiles of the distribution of reported confidence at the trial of decision more often than subjects who scored high in Test anxiety and low in n Achievement. High n Achievement tended to bias the overall level of subjective probability of success upward. Subjects who scored high in n Achievement and low in Test Anxiety tended to increase confidence rapidly up to the level of 50% confidence and then decrease their rate of increase in confidence after the 50% level of confidence had been attained in comparison to subjects who scored low in n Achievement and high in Test Anxiety. Brody concluded that if the foregoing results were replicated in other risk taking situations, they would suggest that subjects for whom it is assumed the motive to achieve success is greater than the motive to avoid failure prefer intermediate risks, but do not necessarily prefer situations where the probability of success is .5. This study, it seems to us, might have interesting implications for the study of creativity. While levels of motivation and risk taking might not necessarily distinguish a highly intelligent from a highly creative group, perhaps these two groups would exhibit differences in their preferences for situations where the probability of success is .5.

Using four broad classes of variables - cognitive judgmental, intellective ability, personality, and decision making, Kogan and Wallach (1964) made a detailed investigation of 114 male undergraduates and 103 female undergraduates. They found that within the risk-taking domain, test anxiety and defensiveness played a critical moderator role. In general, significant relationships among risk taking measures in both sexes emerged most strongly for non-test anxious, non-defensive subjects and/or for highly test-anxious and highly defensive subjects. e.g., Among females high in both test anxiety and defensiveness, decisions were in the risky direction for those high in self-sufficiency and independence and low in rigidity; decisions tended towards conservatism on the other hand for persons low in self-sufficiency and high both in yielding tendencies and rigidity. Among males in this high-high subgroup, decisions tended toward risk taking for persons high in independence, toward conservatism for persons high in the tendency to yield.

The investigators found no evidence to support the hypothesis of a direct association between impulsiveness and risk taking. The hypothesis that self-sufficiency and independence would be related to a preference for chance and skill strategies at intermediate risk levels also was not confirmed. However, very substantial moderator effects were found between the personality and decision-making (risk taking) domains. These effects were dissimilar across sex, indicating that the implications of personality for risk taking behavior were strongly sex-linked. Thus, the expected relationship between impulsiveness and risk taking, which was absent in the male sample taken as a whole, emerged in striking fashion for strategy measures in males low in test anxiety and defensiveness. Where decision outcomes were under personal control, for low test-anxious-low defensive males in skill strategies, self sufficiency contributed to conservatism; for number judgments, it enhanced risk taking. Kogan and Wallach conclude:

> This kind of situational specificity may reflect the differential perception of optimal requirements in the two tasks and is consistent in this respect with other evidence regarding the sensitivity to task or situational contexts that characterizes subjects low in test anxiety and defensiveness (p. 186).

In contrast, subjects who were high in both test anxiety and defensiveness were more likely to be swayed by their particular pattern of motivational dynamics. They tended not to be as sensitive to specific task or situational contexts. While the implications of personality for risk taking behavior in adults were strongly sex-linked, the overall findings did not provide any neat separation between male risk takers and female conservatives.

Although there is relatively little information available concerning children's decision making behavior, it appears that boys are more likely to take risks than girls. Kass (1964) found that 6- to 10-year-old boys in a free-choice, repetitive, "pay to play" situation preferred probabilities of winning involving greater risk taking than did girls. Three slot machines were set at equal expected values - one paying off a cent on every trial for each penny staked, another paying off three cents one out of three times on a random basis for each penny staked, and the third paying off eight cents one out of eight times on a random basis for each penny staked. Boys more frequently chose to play the 1/3 and 1/8 machines, whereas girls more often selected the machine that paid off a penny on each trial for every penny invested. There is also evidence that an individual's choice in a gambling situation may change with experience. Over the series of 210 trials, boys played the high probability machine significantly less frequently and the low probability machine significantly more frequently on the last 30 trials as compared to the first 30 trials. There were no significant differences associated with chronological age.

Slovic (1966) attempted to provide evidence for the validity of the masculinity-boldness stereotype by studying the influence of age and sex upon children's performance on a decision-making task designed to assess risk taking. The experiment was conducted at a county fair with large volunteer samples of children between the ages of 6 and 16. The decision-making task consisted of a series of ten switches, nine of which were "safe," while the tenth was a "disaster" switch. The location of the latter was randomized across trials. The subjects could pull as many switches as they wished and collect candy so long as the "disaster" switch was not pulled. If the "disaster" switch were pulled, the subject would forfeit all of his accumulated candy. The results indicated a sex difference in risk-taking propensity which emerged between the ninth and eleventh year of age; boys were bolder than girls. However, as Slovic points out, "Any generalizations that one might wish to draw from the present study are limited by the fact that the S's included only those children who were curious and daring enough to volunteer to play what was obviously a risk taking game" (p. 175).

Risk Taking and Intelligence

In an analysis of the traits involved in intellectual performance, Guilford (1957) found that risk taking (need for adventure) had zero correlations with scores for both ideational fluency and originality. The factor "need for adventure" emphasized risks to personal safety and personal property. Therefore, he concluded that a person can be a rapid producer of ideas and can be original without having a need for taking risks or obtaining enjoyment from taking risks. Of course, this factor emphasizes the "danger" aspect of risk not the chance or decision aspect.

In considering the relationship between risk taking and intelligence, it has been customary to assume that intelligence influences decision-making behavior. However, the results found by

Kogan and Wallach (1964, ch. 5), who explored the relationship between verbal aptitude (one attribute of intelligence) and risk taking led to the conclusion that under certain conditions verbal aptitude itself may be partially determined by risk taking dispositions. In tests where the instructional sets contain a penalty for guessing, a subject's decision must necessarily reflect individual propensities toward risk taking or conservatism. For high test anxious-low defensive adult males, greater risk was associated with lower verbal ability as measured by the Scholastic Aptitude Test. This suggested that males who experienced severe anxiety in a stressful examination guessed incorrectly when gambling on certain items. However, for low test anxious-low defensive males, the high risk taker obtained higher verbal aptitude scores and the conservative individual obtained lower scores. In the absence of anxiety and defensiveness, risk taking enhanced test performance in the verbal aptitude domain. Results for adult females, although in the same direction, were not as clearcut.

At this time, there is no experimental evidence for the assumption that creative people are more willing to take risks than non-creative people of similar intelligence.

Research and Theory on Anxiety and Defensiveness

Within the psychoanalytic framework, there are three qualities that distinguish anxiety: (1) "a specific quality of unpleasure"; (2) "acts of discharge," and (3) "perceptions of those acts" (Freud, 1936). Some investigators have had a tendency to confuse anxiety and fear in childhood because children will verbalize when they are anxious. Sarason _et al_ (1960) conclude that anxiety in childhood is the important variable to study because most of the fears of children are "imaginary." These fears serve as focal points or screens for anxiety about situations, impulses, and conflicts that are dangerous to the child's sense of security (p. 47). An operational approach consistent with the Freudian conception of anxiety has been developed by Sarason, _et al_ (1960) in the Test Anxiety Scale for Children, General Anxiety Scale for Children and Defensiveness Scale for Children. Anxiety is viewed as a predispositional state variable aroused reliably in some but not all children if they are exposed to a situation with evaluative components. The model proposed by Sarason _et al_ states:

> (a) defensive reactions such as cautiousness have been strongly overlearned and thus are stable automatic responses to the anxiety triggered off by such situations as tests; (b) the effects of anxiety upon performance are mediated by these defensive reactions to the anxiety; (c) in problem solving situations where such defensive reactions are an asset, anxiety has a facilitating effect upon performance; (d) in problem solving situations where such defensive reactions are a liability, anxiety has an interfering effect upon performance (Ruebush, 1960).

An extension of this model to define two somewhat different aspects of anxiety within the psychoanalytic framework is important for this study: (1) Where the experiential aspects of anxiety are emphasized the TASC appears to be a good operational measure of anxiety; (2) where the unconscious aspects of anxiety are defined in terms of defensiveness the DSC appears to be a good operational measure. Defensiveness is another label for unconscious anxiety as described by Freud -- drives capable of arousing anxiety, conflicts, and the like; strong defenses, and the absence of conflict. Highly defensive children are thought to experience anxiety in very stressful circumstances when dangerous drives, conflicts, or memories may approach conscious awareness and produce the experience of anxiety, due to an increase in their strength and/or a breakdown in the defenses (Ruebush, 1963). Wallach and Kogan (1965) state, "If a broad distinction is made between states and styles in personality dynamics, anxiety may be viewed as an experiential state giving rise to various coping reactions, while defensiveness may be described as a particular pervasive style of coping with anxiety" (p. 196). There is evidence that defensive and test-anxious children experience similar conflicts, e.g., dependency, but that these conflicts are manifested more indirectly by defensive children (See Ruebush, 1963).

Because there is a vast literature on anxiety, we have limited our discussion to those aspects of anxiety and defensiveness which are directly relevant to our study. Hence we have discussed briefly only the psychoanalytic theory of anxiety and its operational development by Sarason and his colleagues. We shall continue with a discussion of the relevant empirical findings. (For a comprehensive survey of childhood anxiety, see Ruebush, 1963. An excellent discussion of anxiety and defensiveness in relation to intelligence and creativity is found in Wallach and Kogan, 1965).

In the literature there is fairly conclusive evidence that anxiety in children results in a decline in intelligence test performance (e.g., Sarason and Mandler, 1952; Sarason _et al_, 1960; I. Sarason, 1963; Wallach and Kogan, 1965). It has also been found that there are different patterns of results based on sex differences (Sarason _et al_, 1960; Davidson and Sarason, 1961; Sarason, 1963; Wallach and Kogan, 1965); e.g., the TASC appears to be a more valid measure of anxiety in boys than in girls. The results of studies of children with high and low test anxiety in individual test situations indicate that test anxiety may interfere with performance or may facilitate it, depending upon certain predictable task and situational variables.

On an embedded figures task individually administered to 280 6th grade boys, Ruebush (1960) found that High Anxiety Ss at the low and medium IQ levels were superior on the criterion task. High Anxiety Ss at the high IQ level were inferior. He concludes that the differential effects of anxiety upon performance may vary systematically depending upon both intelligence level and type of task and instructions.

In another study, Lighthall, Ruebush, Sarason and Zweibelson (1959) found that while low test anxious children improved more than high test anxious children over a two-year time span on the "test-like" Otis Beta Intelligence Test, the HA children improved more over the same period on the "game-like" Davis-Eells Test of Problem-solving Ability. But while there are many papers in the literature dealing with anxiety, there are relatively few dealing with defensiveness, a crucial variable in investigations of anxiety in children.

The performance of two groups of 16 fifth-grade boys (selected from a population of 299 boys), one low defensive and low anxious (LD) and the other high defensive and low anxious (HD) on the DSC and TASC was compared on the Porteus Maze Test taken with mothers absent and on a different form of the Porteus plus a jigsaw puzzle test with mothers present. The results suggest that discrepancies between ability and qualitative performance in defensive boys are a function of defensiveness, whereas such discrepancies in quantitative performance are a function of certain components of the test situation. The quantitative performance of HD boys was inferior to that of LD boys only in the mother-absent situation. A test situation heavily loaded with components unfamiliar to the child is more threatening and more likely to cause interference with quantitative performance in defensive children than are evaluative stimuli. Defensive children may not experience anxiety when in a relatively familiar situation - even one loaded with evaluative cues - and thus perform quantitatively at their ability level (Ruebush, Byrum, and Farnham, 1963).

Experimental results of Zimbardo, Barnard and Berkowitz (1963) are consistent with the foregoing study. Boys varying in anxiety and defensiveness were exposed to either an evaluative or a permissive interview. In the evaluative interview, the child was informed that he would be asked some questions about himself before he was to take a test for comparison with other children. In the permissive interview, the child was told that the interviewer wished to chat with him on various matters. Results indicate that the low anxious - high defensive boys yielded considerably higher levels of incomprehensibility and affect under permissive relative to evaluative interview conditions. Highly anxious boys were more disturbed in the evaluative interview conditions.

Davidson and Sarason (1961) made a study of three second grade classes (96 subjects) to determine the relation of anxiety about school to a wide variety of personality and behavior variables measured in the classroom, and to explore the effects of differences in classroom atmosphere upon those relations. The children were observed for four months by two trained observers. As measured by the ratings, TASC scores related significantly to a whole series of personality characteristics for boys, but not for girls, while the reverse was true for the DSC. Other findings suggest that either anxiety or defensiveness may be the meaningful variable for different classrooms, depending on the teacher. The investigators interpret their findings as meaning that test anxiety may be ego-alien for boys and ego-syntonic for girls: "If boys or girls can accept equally being high or low with respect to a given variable that characteristic may be relatively meaningless as a determinant of their behavior and personalities. However, being high or low on a trait that is unacceptable is the difference between having a lot or a little of a disturbing quality or feeling. Anxiety, apparently ego-alien for boys and ego-syntonic for girls, is an effective predictor for the former but not for the latter. Defensiveness, which may well measure ego-syntonic qualities for boys and ego-alien traits for girls, is an effective predictor of the behavior and personality characteristics of girls" (p. 210).

The only empirical study in the literature considering creativity and its relation to anxiety and defensiveness is that of Wallach and Kogan (1965, ch. 6). They took two approaches to their major findings. First, when they viewed personality as a function of creativity and intelligence, significant interaction effects were obtained for both general and test anxiety in boys. In admitting anxiety, highly intelligent-low creative boys were quite low, low intelligent-low creative boys were quite high, and the two highly creative subgroups were intermediate. The low anxiety level for boys of high intelligence and low creativity was explained on the basis of "a neat match between their area of competence and the type of thinking emphasized in the classroom." For example, in terms of Guilford's categories of "convergent" and "divergent thinking," the foregoing subgroup's pattern of thinking would fall in the "convergent" category. It was also found that low defensiveness in boys is related to high creativity only where intelligence level is also high. Second, Wallach and Kogan placed anxiety and defensiveness in the role of antecedents, and creativity and intelligence were made consequents. For boys, test anxiety was inversely related to intelligence, and defensiveness was inversely related to creativity. Both findings confirmed stated hypotheses. Results for girls were less clearcut. Common to boys and girls is the finding that high defensiveness accompanied by low test anxiety is associated with the lowest levels of creativity. But here the similarity ends. For boys, the highest creativity occurs in the low defensive-high test anxious subgroups. For girls, highest creativity occurs in the high test anxious-high defensive subgroup. The investigators conclude that low levels of test anxiety and defensiveness represent more of an asset in boys than in girls. However, the data show that "there is no one-to-one relation between creativity and the absence of psychological disturbance in children." Creative boys and girls are not necessarily the best adjusted children in the classroom. It is the quality rather than the degree of disturbance that matters. Overtly acknowledged anxiety under the stress of evaluative school situations does not especially inhibit creativity, and may in fact enhance it. On the other hand, extreme defensiveness (defensiveness with low test anxiety) contributes to lowered creativity levels. (pp. 234-235).

In contrast to the foregoing study, Flescher (1963) found no relationship between either general or test anxiety, on the one hand, and a composite creativity score on the other. But as Wallach and Kogan point out, the elements in this composite creativity score are not unified among themselves so interpretation is ambiguous. In the Reid, King, and Wickwire study, which we discussed earlier, creative children appear to be less anxious than the non-creative. But as we stated then, there is some question as to whether peer nominations alone is sufficient to identify a distinctive group of creative children.

CHAPTER III

DESIGN OF THE STUDY

Specific Statement of the Problem

The question has been raised as to whether a relationship exists between creativity and risk taking in fifth-grade children. The literature has been reviewed, and the evidence indicates that exploratory work must be done in this area. It has further been shown that empirical findings in the area of creativity and risk taking may have implications important for our understanding of thinking in children. An examination of relationships between the two domains may also help to clarify the theoretical meanings of both creativity and risk taking. This thesis will attempt to answer the following questions:

1. Does a relationship exist between creativity and risk taking in children? If such a relationship is obtained, to what extent can intelligence account for it?
2. Are creativity and intelligence statistically independent modes of thinking?
3. What effects will motivational or personality disturbance have upon a relationship between creativity and risk taking?

Hypotheses

We shall test the following hypotheses:

1. There is a positive correlation between creativity and risk taking in fifth-grade children.
2. Any motivational disturbance will attenuate the relationship between creativity and risk taking in children.

Initial efforts were aimed toward seeking a direct correlation between creativity and risk taking; however, there was no reason to assume that we should find a simple linear relationship. There was evidence that one had to consider creativity within the framework of intelligence. When both levels of creativity and intelligence were considered simultaneously in children, Wallach and Kogan (1965) found conceptual style as well as personality differences. It was possible that intelligence might influence the magnitude and direction of correlation between creativity and risk taking. Since we had gathered IQ data, we were in a position to consider these possible relationships.

In the present study, anxiety, test anxiety, and defensiveness were considered as possible moderator variables. Conceivably, they might moderate relationships between creativity and risk taking. In adults anxiety and defensiveness scales did not correlate directly with risk taking measures but acted as moderators (Kogan and Wallach, 1964). Ghiselli (1963), among others, has pointed out that a substantial body of evidence indicates that there are systematic individual differences in error tendencies, and in the importance a given trait has in determining a particular performance. Reliability and validity of measurement can be increased by the use of moderator variables which predict individual differences in error tendency and in the importance of traits.

The notion that moderators sort heterogeneous aggregations of individuals into homogeneous groups is a very useful way of conceptualizing moderator effects. It focuses attention on the kinds of differences which exist among individuals who in some given respect are homogeneous.

Definitions of the Terms Used

Creativity is . . . "the forming of associative elements into new combinations which either meet specified requirements or are in some way useful" (Mednick, 1962, p. 221).

Operationally, creativity was defined in terms of the scores obtained on two procedures--one verbal, one visual--from the creativity test developed by Wallach and Kogan (1965).

Risk taking was defined operationally in terms of the scores obtained in three decision-making tasks, Shuffleboard, Clues, Draw-a-Circle, where the subject is free to choose the degree of risk under which he will operate.

Anxiety is defined within a psychoanalytic framework as a conscious experience of a "specific unpleasurable quality" induced by inner conflicts against which the individual defends himself through a variety of mechanisms. (Sarason et al, 1960, ch. 1, 2, 3).

Defensiveness is defined as another label for unconscious anxiety, which gives rise to a particular coping reaction.

Operationally anxiety was measured by two scores: (1) test anxiety measured by the Test Anxiety Scale for Children (TASC) and (2) general anxiety measured by the General Anxiety Scale for Children (GASC).

Operationally defensiveness was measured by the Defensiveness Scale for Children (DSC).

Intelligence was defined in terms of an IQ derived from the California Short-Form Test of Mental Maturity.

Selection of Sample

The subjects were 162 fifth-grade children, 10-11 years of age; there were 84 boys and 78 girls in the final sample. Eleven subjects, 6 boys and 5 girls, were lost during the period of data collection because of illness or departure from the school district. The children came from the Lawrence Township and Montgomery Township school districts, from elementary schools in a middle-class suburban area. We limited our sample to children of the middle class because previous related research has been limited to this group (e.g., Getzels and Jackson, 1962; Wallach and Kogan, 1965). Where a creative group has been selected across both middle and lower classes, personality differences have been found based on social status (Reid, King, and Wickwire, 1959). This result is consistent with the findings of Miller and Swanson (1958, 1960) whose extensive work has revealed that emphases in child rearing are influenced by class and social setting. Investigators, generally, having considered social class an important variable to control, have limited their investigations to middle-class children. As the middle class keeps expanding in size and spreading the influence of its values across the nation, it seemed most relevant to focus our study on middle-class children.

We chose the fifth grade because children at this age can easily follow instructions, and they are still relatively free in the elementary school of outside influences determining what risk they "ought to take" (McClelland, 1958). There is a substantial body of evidence to indicate that children in the fifth grade understand the notion of risk taking on both a cognitive and behavioral plane (Kogan and Wallach, 1967, pp. 90-91). Also they have passed the dip in creativity observed by Torrance at the fourth-grade level (Tórrance and Gupta, 1964); the general pattern of the developmental curves of creative thinking abilities assessed by Torrance's tests for fluency, flexibility, originality, and elaboration shows a steady rise from first through third grade, a sharp drop between third and fourth grades, followed by recovery in the fifth grade or between the fourth and fifth grades. (There is a recovery in fluency, but not in originality. Compared to the creativity tests of Wallach and Kogan (1965), where there is a strong relationship between quantity of associates and uniqueness of associates, a recovery of fluency might also indicate a recovery in originality if there were no time limits imposed during testing).

Our sample included both boys and girls to be considered separately because sex differences have been observed in some of the variables in this study. Sex differences in creativity have been found by Getzels and Jackson (1962) and by Torrance (1963a). Wallach and Kogan (1965) also found some sex differences although in general they conclude that creativity is highly similar for both sexes. Getzels and Jackson and Torrance attribute sex differences in creativity to cultural differences in the approach to rearing boys and girls. Sex differences among children have been observed as well in the area of risk taking (Kass, 1964; Slovic, 1966).

There are sex differences too in anxiety (Sarason _et al_, 1960) and defensiveness (Wallach and Kogan, 1965). Sarason _et al_ found that girls obtain significantly higher general anxiety scores than boys. This is explained as reflecting cultural hesitation on the part of the boys; items in the scale center on bodily harm and personal inadequacy, issues of more concern to boys than girls. On the other hand, girls are more interested in social relationships, e.g., fear of rejection (1960, pp. 250-261). Using a modification of the Sarason scales, Wallach and Kogan obtained results consistent with those of Sarason _et al_. They found that girls exhibit more general anxiety; and there were no significant sex differences on test anxiety. Wallach and Kogan have presented the first published evidence of a significant sex difference on a full-length defensiveness scale. Boys are more defensive than girls. Common to both boys and girls, there is a significant inverse relationship between defensiveness and general anxiety. This finding is congruent with theoretical expectations, for defensiveness serves to protect the child from anxiety (1965, ch. 6).

Selection of Instruments

Creativity procedures - Alternate Uses and Pattern Meanings

To define psychological processes that might yield a dimension of creativity, Mednick (1962) concentrated on the introspections of highly creative people. The result was his associative definition of creativity as "the forming of associative elements into new combinations which either meet specified requirements or are in some way useful" (p. 221). From Mednick's definition, Wallach and Kogan (1965) structured a situation in which the person's associational behavior would be oriented toward a given requirement that would guide the nature of his responses. Under such conditions, then, where the appropriateness of associations was held constant and present, two variables were deduced to reflect individual differences in creativity; the total number of associates and the relative uniqueness of the associates. The flow of the creative process, however, had to occur under conditions where there was no time pressure and where the associator would be allowed a playful, permissive task attitude.

Mednick (1962) had proposed two hypothetical gradients of associative strength for the responses to a stimulus word; high creativity was linked with a shallow slope, low creativity with a steep slope. Since it was expected that unique associates would come later in a sequence of responses, time became important for expression of creativity.

There is the general question of whether a response that is unique in the sample as a whole can be considered a unique product for the child who produced it. Wallach and Kogan reply,

> The answer to this question would obviously require the kind of detailed clinical and biographical study of each child that is impossible to carry out in practice. On the other hand we propose that, in a sample of 151 school children of fairly homogeneous socioeconomic background, a unique response which is at the same time appropriate to task demands will have considerable relevance for the associational conception of creativity. . . . We are suggesting in other words, that there is a substantial degree of correspondence between 'actuarial' and 'personal' uniqueness, when samples derive from a reasonably homogeneous sociocultural matrix. If one accepts the conception that unique associates emerge later in the associational sequence, then

> we can proceed to examine the actual magnitude of relations between quantity and uniqueness of associates. Strong positive correlations would increase our confidence in the relevance of the uniqueness index. Empirical relationships do in fact assume that form (p. 37).

The entire battery of creativity tests consisted of procedures to generate five types of associates. From this more lengthy battery, we selected Alternate Uses which generates verbal associates and Pattern Meanings which generates visual associates. In Alternate Uses the child is asked to think of as many uses as he can for a verbally specified object. In Pattern Meanings the child is asked to respond to each of the abstract visual designs, considering the design as a complete entity.

To determine the reliability of their creativity instruments, Wallach and Kogan calculated the split-half reliability of each measure according to the Spearman-Brown prophecy formula. This formula considers the degree of relationship between two randomly chosen halves of a set of items, the odd items and the even items. They report the following reliability coefficients: Alternate Uses -- uniqueness, .87; number .93. Pattern Meanings -- uniqueness, .88; number, .93 (N = 151).

An item analysis was also made to determine the extent to which every item is contributing to the score provided by the sum of all items. Such an item analysis consists of item-sum correlations in which the score of each item is correlated in turn with the sum of the scores of all items. Following are the item-sum correlations for the two procedures:

Item-Sum Correlations for the Alternate Uses Procedure (N = 151)

Item	Uniqueness	Number
1	.48	.80
2	.59	.79
3	.69	.83
4	.76	.84
5	.83	.86
6	.79	.83
7	.73	.83
8	.73	.84

Item-Sum Correlations for the Pattern Meanings Procedure (N = 151)

Item	Uniqueness	Number
1	.64	.74
2	.78	.83
3	.80	.85
4	.69	.83
5	.80	.85
6	.78	.82
7	.75	.75
8	.64	.69

Inter-scorer reliability defined as the percentage of agreement between scores on the creativity battery is in the vicinity of 80% to 90%. We selected Alternate Uses and Pattern Meanings because both tests appeared to be valid and reliable measures of creativity as defined by Mednick.

Risk Taking Procedures

As we have previously stated, the study of risk taking is complex; involved are not only personality factors but task structure and situational factors as well. Since the concept of risk taking is not clear-cut, it appeared for our purposes desirable to use a number of different measures to assess risk taking. In this way we were attempting to establish convergent validity as described by Campbell and Fiske (1959). We chose three risk taking tasks, each qualitatively somewhat different from the others; but each task fell within the category of allowing the subject to choose the degree of risk under which he would perform. However, it was only in the Shuffleboard game that the subject received immediate feedback, involving definite success or failure experiences. Both the Shuffleboard task and Clues overtly contained the element of risk in performance; in Shuffleboard, the subject had to decide at what point to try his skill, while in Clues he had to decide at what point to chance guessing the answer. In Draw-a-Circle the risk was not overt.

Draw-a-Circle as a measure of risk is a paper and pencil modification of the Ring Toss adapted by McClelland (1961, pp. 212-213) for use in his cross-cultural experiments on entrepreneurial role behavior. A characteristic of entrepreneurial role behavior, derived from the psychological theory of n Achievement, is moderate risk taking as a function of skill not chance. Practically all theorists agree that entrepreneurship involves by definition, taking risks of some kind, in other words "decision-making under uncertainty." It has been found in the U. S. that subjects with high n Achievement chose to work on tasks of moderate difficulty more often than subjects with low n Achievement. McClelland attempted to check these findings cross-culturally in Germany, Brazil, and India using as subjects sixteen-year-old boys who were studied intensively to discover the "universal" correlates of n Achievement. In groups the subjects were given a piece of folded paper, asked to draw a circle on it, then to turn it over and try to place a cross in the center of the circle. The tendency of a subject to choose a level of risk was determined by the deviation of his circle from the average diameter of all the circles. McClelland reasoned that if the subject drew a very large circle, it would be easier for him to put a cross in the center of it without seeing it, whereas the smaller the circle the harder it would be for him to succeed. The dynamics of the situation were supposedly analagous to Ring Ross in which success is easier or harder depending on how far away from the peg a person stands. It was predicted that, as in Ring Toss, boys with high n Achievement would choose to draw circles of moderate size, whereas boys with low n Achievement would show no consistent preferences.

The smaller the boy's deviation score, the more he had chosen to draw a circle of average size, representing medium difficulty as compared with his group of peers. The correlation of the deviation scores with n Achievement was in the predicted direction in all three countries but reached significance only in Brazil, where it was -.13 (N = 367, p. < .02). In Germany the correlation was only -.001 (N = 386) and in India -.07 (N = 150). The combined probability does not quite reach the .05 level, so confirmation of the hypothesis is weak. McClelland's justification for paying attention to such trivially low correlations was that the purpose of the research was to gather empirical evidence across a number of countries as to whether or not the relationships existed at all and were sufficiently worthy of belief to merit more detailed study as to the extent of relationships. To design experiments which would reduce error variance to a minimum in each country so that the main effects could influence the outcome strongly would have been prohibitively expensive in time and money.

We pretested Draw-a-Circle on 21 fourth-graders, 9 to 10 years of age, in a group session. The task was administered twice within a half-hour, with other tasks intervening. We found a distribution of scores indicating that this measure deserved further study. (See Appendix A for the list of scores). Children found this game amusing and the directions easy to understand. For these reasons, we decided to begin the individual testing sessions with Draw-a-Circle. It was a good "ice-breaker." And while this task may have appeared trivial to the sixteen-year-olds on whom it was used by McClelland, for children of elementary school age, Draw-a-Circle appeared to have a great deal of face validity as a game.

Clues. Studies have shown that individuals differ characteristically in the amount of information they require before risking a decision (Slovic, 1964). But, there has been comparatively little experimental work done in the field of sequential decision making, despite the fact that many of the decisions in our daily life involve just this kind of complexity. When an individual is faced with making a decision, he is not simply making a selection between A and B, but he is also deciding whether he has sufficient information to make a choice. By waiting, an individual may gain more information relative to the matter in hand; but he also faces the possibility that by waiting to make a choice, he may not achieve what he had desired.

To measure sequential decision making, Clues tasks were devised by Worley (1960) and Roberts (1960). In the Clues tasks the subjects guessed the identity of common objects, such as baseball bat, goat, and postage stamp, on the basis of increasingly more specific clues provided one at a time. The object of the task was to arrive at the correct answer with the fewest number of clues. The experimenter was interested in how subjects perceived information and how they acted upon perceived information rather than how they used objective information compared to how they should have used objective information. It was found that the number of trials taken before making a decision was a reliable measure of information seeking behavior. (Each clue was a trial).

In the experiment designed by Worley (1960) to test the effects of high and low incentive on information-seeking behavior in sequential decision-making situations, three types of decision-making tasks were used: a Dice Task, a Marble Task, and a Clues Task. With a sample of 72 subjects, Worley found for Clues a reliability of .78 for his high incentive group and a reliability of .71 for his low incentive group. The amount of information sought, measured as number of trials taken in the Clues Tasks, correlated significantly with the two other Tasks, Dice and Marble, in four out of six cases and were in the direction predicted. The other two of the six correlations, although not significant, were also in the direction predicted. The results also suggest that increasing incentive may increase rather than, as had been previously found, reduce amount of information sought. The prediction that the correlations between tasks would be larger with high than with low incentive was not confirmed.

Roberts (1960) in a study designed to explore further the relationship between level of anxiety and information seeking in sequential decision making also used, among other measures, three Clues tasks. The data obtained failed to confirm any positive correlations between scores on the Achievement Anxiety Test and number of clues taken in any of the three Clues tasks. However, the prediction that subjects who have just experienced failure in problem solving will seek more information in subsequent decision making than subjects who have just experienced success was confirmed.

Kogan and Wallach (1964), in their investigation of risk taking as it operates within a motivational context, adapted the Clues task from Worley and Roberts as one of their reliable decision-making measures. Kogan and Wallach were attempting to determine whether relationships within the decision-making domain were a joint product of structural task-similarities and of underlying mechanisms of risk regulation. In the Clues task, a single score was derived--the average number of clues desired over four objects. The greater the number of clues requested, the more conservative was the decision making (pp. 30, 50-57). They reported for Clues reliabilities of .36 with adult males (N = 114) and .54 with adult females (N = 103). While these reliabilities are considered only moderate, it should be emphasized that the average interitem r reported is a minimum estimate of reliability. Within the decision-making domain, it was found that there are statistically significant consistencies in risk taking across the skill strategy and information-seeking tasks; e.g., the risk taker in a motor skill context preferred the uncertainty of a large prize to the certainty of a smaller one in an information-seeking context. Within the information-seeking domain, the amount of information requested by a subject in attempting to identify an object was consistent with the amount of information he liked to have before deciding on the mean of a distribution of numbers. However, a striking sex difference was evident in this area. Males high on both test anxiety and defensiveness exhibited the strongest consistency within the information-seeking domain; females low on both test anxiety and defensiveness showed the greatest consistency.

In this study two Clues tasks were used. The subjects guessed the identity of two common objects, baseball bat and goat, on the basis of twenty-three clues provided. These two objects were used in the cited foregoing studies. The clues were printed on 3" x 5" cards and exposed to the subject one at a time. A prize of one dollar was offered for a correct guess with the fewest number of clues. Subjects were not informed of the actual identities of the objects used in the task. Information about winnings was withheld until the end of the experiment.

In a pretest of the two Clues tasks on a group of 30 fifth-graders, 18 boys and 12 girls, we found a split-half reliability of .66. The range of scores may be found in Appendix B.

Shuffleboard

A shuffleboard game was used to test risk taking under motor skill conditions. The shuffleboard game is analagous to ring toss, one of the original Lewinian level-of-aspiration tasks. Shuffleboard was used to test risk taking in a study by Atkinson, Bastian, Earl, and Litwin (1960) and by Kogan and Wallach (1964).

The study by Atkinson *et al* was concerned with the effects of individual differences in strength of achievement motive on (a) goal setting inferred from choices individuals make among tasks varying in difficulty and (b) preferences for imaginary bets equated for expected monetary value but differing in probability of winning. In a shuffleboard game, 66 college men were allowed to shoot from any of 15 lines varying in distance from the target. Subjects high in n Achievement initially shot from intermediate distances significantly more often than subjects low in n Achievement. But when it became apparent after practice that the probability of success was .50 much closer to the target, subjects high in n Achievement then took more shots than subjects low in n Achievement from up close. The high n Achievement group also preferred intermediate risk bets over extreme risk bets significantly more often than the low n Achievement group, when the expected monetary value of the bet was small. These results were consistent with Atkinson's theory concerning motivational determinants of risk taking behavior.

In the study by Kogan and Wallach (1964) the shuffleboard was used to obtain strategy indexes under skill conditions. The purpose was to gather evidence on the question of the generality of risk-taking behavior across hypothetical and payoff contexts. The evidence for such generality was strongly positive for females, moderately positive for males. For males, significant relationships with the hypothetical choice dilemmas situation were limited to chance and skill strategies. For the female sample, significant relationships obtained between choice dilemmas and all other decision-making procedures employed in the study. Substantial moderator effects of anxiety and defensiveness were found in both sexes (pp. 27-29, 47).

In a pretest of Shuffleboard, we were able to observe that this task had real incentive value for children because of its game-like properties. It was also evident that Shuffleboard intrinsically had a risk quality; there was the incentive to win under the conditions of the game, and, at the same time, there was considerable variation in the likelihood of achieving that goal. By definition one had a situation of risk because objective probabilities could be manipulated and simultaneously there were differences in subjective probabilities of success.

Our shuffleboard game was an adaptation of the same apparatus used successfully with adults by Kogan and Wallach (1964). The apparatus consisted of a Formica-top board, 7 feet long and 1 foot wide, mounted on a wooden base 3 feet high. A backboard was attached to one end of the shuffleboard as a backstop for the puck (a penny). Embedded in the backboard was a 10-inch ruler, with readings in units of 1/4 of an inch from 0 at the geometrical center of the board to 5 inches at the extreme left and 5 inches at the extreme right. Two aluminum markers were placed against the backboard on opposite sides of the 0 point and equidistant from it. The experimenter provided the subject with a penny and with a shuffleboard stick. The subject's task was to shoot the penny from a specified point to the area between the two aluminum markers without touching either of the markers. The distance between the markers could be narrowed or widened with the aid of the backboard ruler by the experimenter. Satisfying the backboard criterion could be made progressively more difficult by narrowing the distance between the markers. The experimenter requested that the subject release the penny from the stick before it crossed a line located $1\frac{1}{2}$ feet from the subject's end of the board. The subject was given 20 trials from any positions that he chose. Before the subject began the trials, he was requested to give two estimates of the most difficult positions at which he thought he could be successful. Thus, in addition to results on the actual trials, we had a wishful type of measure--an index of confidence; this was our measure of subjective probability of success.

Measures of Anxiety and Defensiveness

The anxiety and defensiveness measures used in this investigation were the same measures used by Wallach and Kogan (1965), a modification of the scales developed by Sarason and his associates (Sarason _et al_, 1960; Davidson and Sarason, 1961). The 88-item inventory consisting of self-descriptive questionnaire materials included the following scales: anxiety (20 items), test anxiety (19 items), defensiveness (27 items), test defensiveness (6 items), social extraversion fillers (10 items), general fillers (6 items). In the original Sarason scales, the items were presented as questions; in the modification by Wallach and Kogan, the items were presented in the first-person declarative form. The scales were also slightly shortened by eliminating some items that were repetitive. Items were keyed in the direction of the scale label, hence higher scores reflected greater anxiety, test anxiety, and defensiveness. Reliabilities (coefficient alphas) computed on the total sample for each of the scale yielded .86 for anxiety, .87 for test anxiety, and .74 for defensiveness.

The GASC and TASC developed by Sarason _et al_ have been found to be internally consistent and to have statisfactory test-retest reliability. Normative data means and variances are available for American, Australian, and Norwegian elementary school children. There are several types of direct evidence on validity of the TASC as a specific measure of anxiety in test-like situations; e.g., in view of the tendency for more tests to be administered as grade level increases, it is relevant that TASC scores increase significantly with grade. Moderate but consistently significant negative relationships have been obtained between TASC scores and group intelligence and achievement tests (Ruebush, 1963, pp. 479-489).

The Defensiveness Scale for Children (DSC) has the major number of items designed to measure the tendency to deny feelings such as anxiety, guilt, hostility and inadequacy, even when their expression is appropriate. The split-half reliability of the scale is .82. While the DSC has been developed only recently, Ruebush states that initial findings on validity are promising.

Intelligence Measure

As an IQ measure we selected the California Short-Form Test of Mental Maturity, Elementary, S-Form, developed by Elizabeth T. Sullivan, W. W. Clark, and E. W. Tiegs for the California Test Bureau. In the original form, the conceptual framework for the California Test of Mental Maturity was that of the Stanford-Binet Scale. The fuller version has been in use for over twenty years. The experience and mass of data thus accumulated has been used to improve the shortened series. According to Cyril Burt (in Buros, 1959, p. 314), "The outcome is one of the best sets of group tests at present available." Seven subtests are used which sample four main areas of mental activity: spatial relations, logical reasoning, numerical reasoning, and verbal concepts. Norms are given in terms of mental ages and IQ's for the language and non-language sections of the test. Variety of content, the high proportion of non-verbal problems, and lucid directions for administering the test are commendable features. With the Kuder-Richardson formula 21 the reliability of the total scores varies between .87 and .89 at most grade levels. The validity coefficients consist of observed and corrected correlations with the Stanford-Binet and Wechsler Intelligence Scale for Children, and with group tests. They average about .75. The intercorrelations between the measurements for the four "mental factors" are positive at every stage and usually range from .30 to .60. Hence, there appears to be a general cognitive factor supporting the authors' claim that the test, taken as a whole, provides an excellent instrument for assessing general "capacity." From this test we obtained three IQ scores: language IQ, non-language IQ and Total IQ.

Procedures

Administration

We administered both individual and group measures. The individual measures consisted of two tasks for creativity and three tasks for risk taking. The group measures were the anxiety-defensiveness scale and the intelligence test. The individual measures were administered first to all the subjects, before we proceeded with the group measures. This sequence was important because the nature of the individual assessment situation required a relaxed and game-like atmosphere without time pressure. On the other hand, the anxiety-defensiveness scale required administration in the classroom in a typical test setting. The order of presentation of the individual procedures was as follows: (1) Draw-a-Circle (risk); (2) Alternate Uses (creativity, verbal); (3) Draw-a-Circle (risk, repeat); (4) Pattern Meanings (creativity, visual); (5) Clues (risk); (6) Shuffleboard (risk). We placed Shuffleboard at the end of the individual procedures because it was the only measure that provided the subject with immediate feedback in terms of success or failure. Hence there would not be any uncalculable effects from this procedure if it were in the terminal position. In all of the individual procedures, except Draw-a-Circle, the examiner recorded the child's answers.

At the conclusion of the individual testing session, each subject was asked to vote for his first and second favorite choices among the "games" he had played. The aim was to informally assess degree of task-involvement and, at the same time, to conclude the testing session in such a way that there would be a minimum of conscious feedback on content of procedures to other classmates who had not as yet been tested.

Directions and Scoring for Creativity Measures

Alternate Uses. In this task the child is asked to think of as many possible uses as he can for a verbally specified object. The task is introduced in the following way: "Now, in this game, I am going to name an object--any kind of object, like a light bulb or the floor--and it will be your job to tell me lots of different ways that the object could be used. Any object can be used in a lot of different ways. For example, think about string. What are some of the ways you can think of that you might use string?" (The experimenter lets the child try). "Yes, those are fine. I was thinking that you could also use string to attach a fish hook, to jump rope, to sew with, to hang clothes on, and to pull shades." (The experimenter varies her suggestions so as not to duplicate any which the child has provided). "There are lots more, too, and yours are very good examples. I can see that you already understand how we play this game. So let's begin now. And remember, think of all the different ways you could use the object that I name. Here we go."

The eight items in the Alternate Uses instrument follow:

(1) "Tell me all the different ways you could use a newspaper."

(2) "Tell me all the different ways you could use a knife."

(3) "Tell me all the different ways you could use an automobile tire--either the tube or the outer part."

(4) "Tell me all the different ways you could use a cork."

(5) "Tell me all the different ways you could use a shoe."

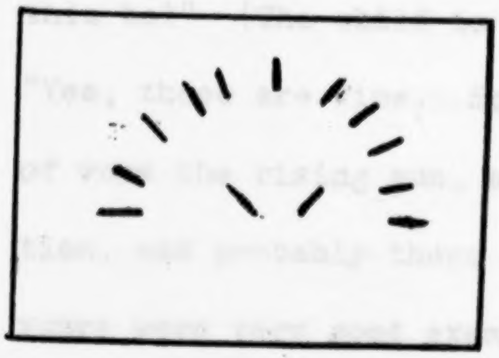
(6) "Tell me all the different ways you could use a button--the kind that is used on clothing."

(7) "Tell me all the different ways you could use a key--the kind that is used in doors."

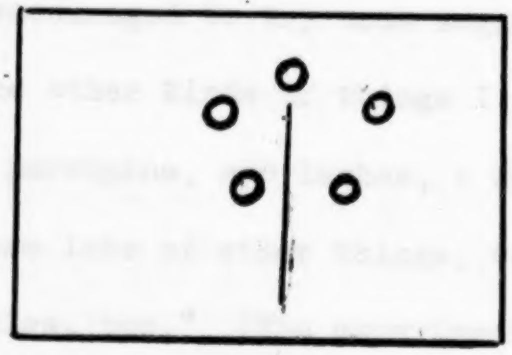
(8) "Tell me all the different ways you could use a chair."

Pattern Meanings. The Pattern Meanings instrument uses visual rather than verbal stimulus materials. To each of the abstract visual designs, the child is asked to respond, considering the design as a complete entity. Pattern Meanings consists of eight items in addition to the sample. See the following page for a copy of the Pattern Meanings materials. The procedure is introduced to the child as follows: "Here's a game where you can really feel free to use your imagination. In this game I am going to show you some drawings. After looking at each one, I want you to tell me all the things you think each complete drawing could be. Here is an example--you can turn it any way you'd like to." (The

Stimulus Materials for the Pattern Meanings Procedure (Original cards, 4 in. × 6 in.)



Example



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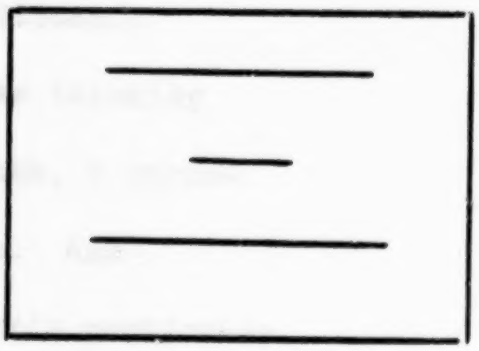

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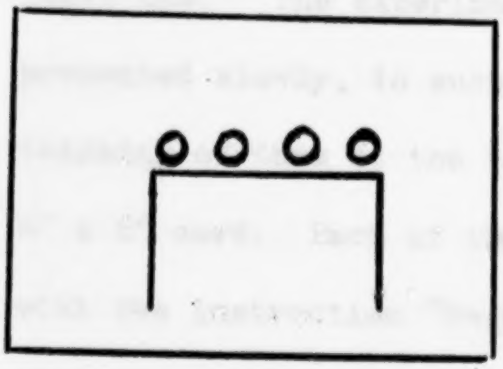

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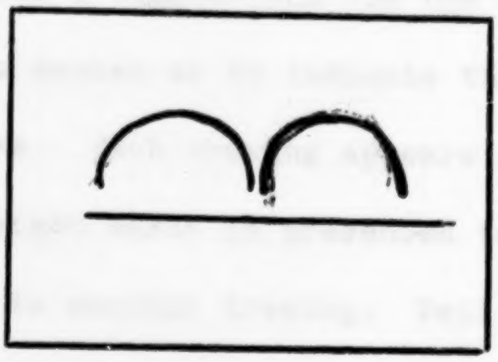

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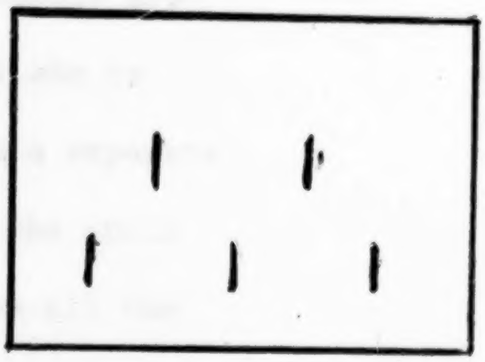

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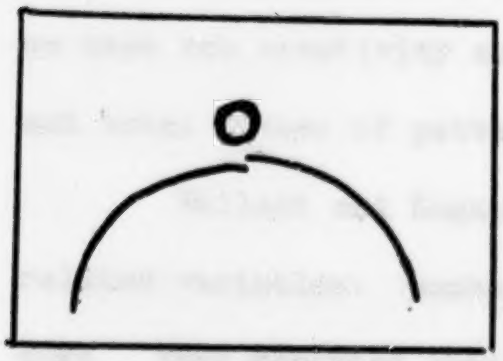

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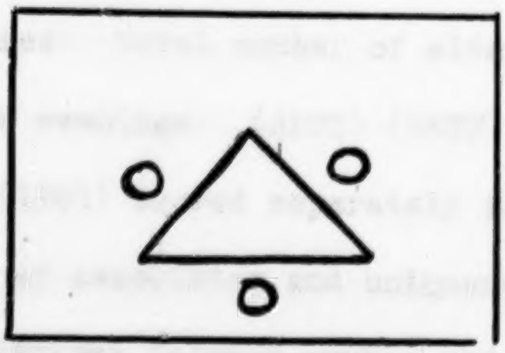

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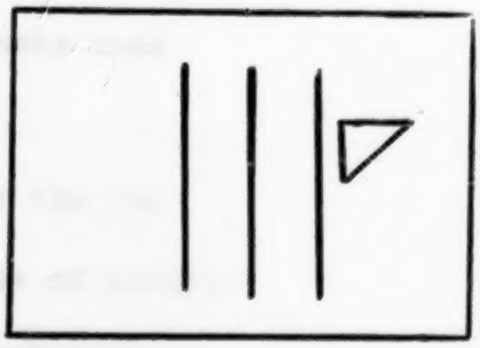

8

experimenter gives the example card to the child). "What could this be?" (The child is encouraged to try some suggestions). "Yes, those are fine. Some other kinds of things I was thinking of were the rising sun, a porcupine, eye lashes, a brush, a carnation, and probably there are lots of other things, too. And yours were very good examples, too." (The experimenter's particular suggestions are varied so as not to include any given by the child). "I can see that you already know how we play this game. So let's begin now." The experimenter's suggestions for the example are presented slowly, in such a manner as to indicate that she is thinking of them at the time. Each drawing appears on a separate 4" x 6" card. Each of the eight cards is presented to the child with the instruction "Here is another drawing. Tell me all the things you think this could be."

Scoring. For each of the eight items in each creativity test one sums up the number of different associates. Hence we have two creativity scores: total number of alternate uses and total number of pattern meanings. (ALTT) (PATT)

Wallach and Kogan (1965) scored separately for the two related variables: number of associates and uniqueness of associates. They reported correlations between number and uniqueness of associates ranging from .60 to .85. Dr. Kogan suggested as a first approximation, therefore, scoring only for number of different associates.

As Getzels and Jackson (1962) have pointed out, the development of scoring procedures for tests of creativity presents some unusual problems. The choice between subjective and objective scoring methods is of great importance. The problem is how to reflect in a score the richness and uniqueness of a subject's response without sacrificing scoring reliability. After trying a number of unnecessarily elaborate and time-consuming scoring procedures, Getzels and Jackson in a subsequent analysis found that many of the scoring procedures contained subtleties that had little effect on the subject's total score. For example, the original scoring of their Word Association Test (one of the tests in their creativity battery) required a rating of each subject's response on total number of meanings, number of different meanings and the relative uniqueness of each meaning. Later it was found that using only the number of different meanings produced results almost identical with the former more elaborate scoring system. The rank order correlation between the elaborate older system and the new system for forty subjects was .97 (pp. 198-199).

Directions and Scoring for Risk Taking Measures

Draw-a-Circle. The examiner hands a sheet of unlined opaque 8½" x 11" paper folded in half to the subject with the following instructions: "In this game we have a piece of folded paper. I want you to draw a circle on one side of the paper. Then turn the paper over and draw a cross in the center of the circle, that is where you think the center of the circle would be if you could see the circle."

Scoring. A grid was devised to measure the circles in centimeters. Because children drawing a circle free-hand were not likely to have uniformly round circles, the following measurements were made: length of circle 1, (DCL1); length of circle 2, (DCL2); total length of the two circles, (DCLT); diameter of circle 1, (DCD1); diameter of circle 2 (DCD2); total diameter of the two circles, (DCDT); ratio of length to diameter in circle 1, (DCR1); ratio of length to diameter in circle 2, (DCR2); and total ratio, (DCRT).

Clues. Directions are as follows: "In this game called Clues, you must try to figure out the name of the object. I will give you up to 23 clues. I'll show the clues to you one at a time. You can give me one answer, whenever you want to. The sooner you make up your mind, the more points you will receive if your answer is right. Of course, if your answer is wrong, you won't get any points. There is a prize of $1.00 for the person who gets the most points. Remember, you can give only one answer and the sooner the better if it's right. Let's begin." . . . "Now you have a chance to play the game again. The same rules apply. Remember, you can give only one answer and the sooner the better if it's right." See the following page for the complete list of clues.

Scoring. For the Clues procedure the following scores were recorded: number of clues requested for each object (CLN1 and CLN2), total number of clues requested for the two objects (CLTN), success for each clues procedure (CLC1 and CLC2), total number of successes (CLCT).

Shuffleboard. Directions for the Shuffleboard game are as follows: "We are going to play this shuffleboard game. Here is the puck and here is the shuffleboard stick. Hold it tilted. You hold it in this position--like this. You start from this point and you must release it by the time you reach this line. (Experimenter demonstrates). The purpose of the game is to aim the penny so it goes between the markers without touching either one of them. Before we start playing the game, though, I want you to give me an estimate of how close you think you can have the markers and still get the penny between without touching them. In this game you will have 20 tries, and I will set the markers for every try at any position you choose. Now let's start with the estimates. Watch me. When I place the markers all the way out here at 5, everybody can get the penny between the markers; I'll start moving them together. You tell me when to stop. Good, you understand the directions. . . . Now when I start with the markers together,

Clues Goat

1. Living animal
2. Not human
3. Its flesh can be eaten
4. Does not fly
5. Four legs
6. Covered with hair
7. Larger than a cat
8. Has hooves
9. Makes sounds you would recognize
10. Eats grass
11. More often found in Europe than in this country
12. Can be tamed
13. Often found on farms
14. Its skin is useful for making things
15. Not a cow
16. Smaller than a horse
17. Has a short tail
18. One kind is found in mountain regions
19. Has horns
20. Not a sheep
21. Its milk can be used by people
22. Its milk can be used to make a special kind of cheese
23. Can butt objects with its horns

Clues Baseball Bat

1. A manufactured thing
2. Can be lifted and carried
3. Always made in the same shape
4. No moving parts
5. Can be used by boys and girls
6. Used when playing a game
7. Held while being used
8. Used in a particular sport
9. Comes in contact with another object when being used
10. Is not thrown
11. Is not rolled when used
12. Not any sort of ball
13. Sport in which it is used is played outdoors
14. Longer than it is wide
15. Made of wood
16. Made in standard sizes
17. Not any sort of racquet
18. Made from a single piece of wood
19. Not a hockey stick
20. Round in one dimension
21. Thicker at one end and thinner at the other
22. Sport in which it is used is played in summer
23. Sport in which it is used has two major leagues

of course nobody can get the penny between. As I start moving them apart, you tell me when to stop. All right, how we start the game. Remember, you will have 20 tries, and you can have the markers placed in any position you want. Now, let's see how good you are." (Experimenter tells subject when he has completed the fifth, tenth, fifteenth, and last trials).

Scoring on Shuffleboard

1. Average expectancy (A EXP) is the average of two estimates of how close together the subject thinks he can have the markers and still get the penny between without touching them. Smaller numbers indicate a higher degree of risk taking.

2. Overall average (O AVE) is the average of the distances between the two markers on the 20 trials. Smaller scores indicate greater risk taking.

3. Conservative shift (C SHFT) is the total number of changes in the position of the markers from a narrower to a wider separation on the backboard during the 20 trials.

4. Risky shift (R SHFT) is the total number of changes in the position of the markers from a wider to a narrower separation on the backboard during the 20 trials.

5. Success (SUC) is a measure of the total number of times the subject was successful in placing the puck between the markers without touching them.

6. Safest choice minus expectancy (SC-EXP) is the difference between the average expectancy and the largest or most conservative distance between markers for each subject.

7. Riskiest choice minus expectancy (RC-EXP) is the difference between the average expectancy and the smallest or riskiest distance between markers for each subject.

Atkinson and Litwin (1960) point out that various ways of analyzing data into easy, intermediate, and difficult regions show that all methods yield comparable results. In a ring toss game they used an average deviation score as did McClelland (1958).

Directions and Scoring for Anxiety-defensiveness scales.

On the following pages is a copy of the 88-item anxiety-defensiveness inventory including the directions. This inventory is administered in the classroom. The examiner reads aloud the directions after the inventory has been distributed so the class can follow along. Then the examiner reads each statement aloud and waits a second to permit time for response, proceeding thus through the entire inventory.

Scoring: three separate scores were derived from the inventory: general anxiety (Anx.), test anxiety (T. Anx.) and defensiveness (Defn.). Higher scores reflect greater anxiety, test anxiety and defensiveness. The following 20 statements are part of the anxiety scale: 7, 8, 13, 19, 31, 34, 42, 45, 46, 53, 56, 57, 67, 68, 75, 76, 77, 80, 83, 87. The following 19 statements constitute the test anxiety scale: 11, 15, 21, 23, 27, 28, 33, 35, 43, 50, 52, 54, 59, 60, 61, 71, 73, 78, 82. The following 27 items compose the defensiveness scale: 3, 4, 5, 6, 9, 14, 16, This game is called "What I am Like." There are a lot of sentences printed below, and you are to pick out all the ones that seem to describe you. If a sentence does describe what you are like, draw a circle around it. But if a sentence does not describe what you are like, then leave it as it is and go on to the next one. There's no need to rush.

1. I like to watch television before dinner most evenings.
2. I like to play in the snow.
3. I feel cross and grouchy sometimes.
4. I never worry about what people think of me.
5. I always tell the truth.
6. No one has ever been able to scare me.
7. I am afraid of things like snakes.
8. I get a scary feeling when I see a dead animal.
9. I never get scolded.
10. I never worry about knowing my lessons.
11. When the teacher asks me to read aloud, I am afraid that I am going to make some bad mistakes.
12. I never worry about how well I did on a test after I've taken it.
13. I am afraid of spiders.
14. I am sometimes afraid of getting into arguments.
15. I worry a lot while I am taking a test.
16. I have never had a scary dream.
17. I like to spend most of my spare time with friends.

18. There are some people I don't like.

19. I worry that I might get sick.

20. I am a very lively person.

21. When the teacher says that she is going to give the class a test, I become afraid that I will do poorly.

22. Once I make up my mind to do domething, I do it.

23. I wish a lot of times that I didn't worry so much about tests.

24. I like everyone I know.

25. I like to go on trips with my mother and father.

26. I sometimes lose my temper.

27. I sometimes dream at night that I did poorly on a test I had in school that day.

28. When the teacher says that she is going to call upon some boys and girls in the class to do arithmetic problems, I hope that she will call on someone else and not on me.

29. I usually don't say much when I am together with other boys or girls.

30. I have never been afraid of getting hurt.

31. When I am in bed at night trying to go to sleep, I often find I am worrying about something.

32. There are some things about myself I'd change if I could.

33. When I am taking a hard test, I forget some things that I knew very well before I started taking the test.

34. I get scared when I have to go into a dark room.

35. I think I worry more about school than other boys and girls do.

36. I never worry.

37. I don't feel sorry for any of the things I have done.

38. I love to play games best of all.

39. I never worry when the teacher says that she is going to ask me questions to find out how much I know.

40. I find it easy to make new friends.

41. I'm sometimes sorry for the things I do.

42. I am afraid of being bitten or hurt by a dog.

43. When I am home and thinking about my lessons for the next day, I worry that I will do poorly on them.

44. I always do the right thing.

45. Some of the stories on radio and television scare me.

46. I think I worry more than other boys and girls.

47. I like to go to the beach in the summertime.

48. I never worry about something bad happening to someone I know.

49. I don't feel badly when someone scolds me.

50. I sometimes dream at night that I am in school and cannot answer the teacher's questions.

51. I am never shy.

52. When I am in bed at night, I sometimes worry about how I am going to do in class the next day.

53. I am frightened by lightning and thunderstorms.

54. I am afraid of school tests.

55. I like to play pranks on other boys or girls.

56. When I am alone in a room and hear a strange noise, I get a frightened feeling.

57. I worry that I might get hurt in some accident.

58. Sometimes when I get mad, I feel like smashing something.

59. While I am on my way to school, I sometimes worry that the teacher may give the class a test.

60. I worry about being promoted at the end of the year.

61. I sometimes dream at night that the teacher is angry because I do not know my lessons.

62. I never worry about what is going to happen.

63. I never hurt anybody's feelings.

64. I sometimes dream about things I don't like to talk about.

65. I like cartoon movies best of all.

66. I never worry about my school grades.

67. When I am away from home, I worry about what might be happening at home.

68. I am frightened when I look down from a high place.

69. I am never unhappy.

70. When I am together with other boys or girls, I am usually the leader of the group.

71. When the teacher says that she is going to give the class a test, I get a nervous or funny feeling.

72. I would rather have a few close friends than many friends.

73. When the teacher says that she is going to find out how much I have learned, my heart begins to beat faster.

74. If I am sick and miss school, I never worry that I will do more poorly in my school work when I return to school.

75. I sometimes get the feeling that something bad is going to happen to me.

76. I sometimes worry about whether my father is going to get sick.

77. I get scared when I have to walk home alone at night.

78. When the teacher says that she is going to find out how much I have learned, I get a funny feeling in my stomach.

79. Other people think I am pretty lively.

80. Without knowing why, I sometimes get a funny feeling in my stomach.

81. I never worry before I take a test.

82. When the teacher asks me to write on the blackboard in front of the class, the hand I write with sometimes shakes a little.

83. I sometimes worry about whether my mother is going to get sick.

84. I am a person who likes to talk a lot.

85. I never have arguments with my mother and father.

86. When I was younger there were some things that scared me.

87. I get worried when I have to go to the doctor's office.

88. I always know what to say to people.

18, 24, 26, 30, 32, 36, 37, 41, 44, 48, 49, 51, 58, 62, 63, 64, 69, 85, 86, 88.

Method of Analysis

This analysis involved the computation of a matrix of intercorrelations between all pairs of variables. In reporting a relationship between a pair of variables, Pearson product-moment correlation coefficients were used for the male and female samples as a whole. Part correlations then were computed to determine the influence of certain key variables.

We proceeded with a moderator analysis, casting anxiety, test anxiety and defensiveness into the role of moderators. The expectation of moderator effects necessarily implies a nonlinear model. The moderator analysis consists of ordering all subjects within sex on the moderator, and then dividing the samples as close to the median as feasible into highs and lows. This technique provides a conservative basis for constituting subgroups, for it includes all of the dimensions in question. Because subjects on opposite sides of the median within this middle range must be more similar than different, the procedure necessarily has the effect of reducing correlational differences between subgroups. Any observed differences, therefore, would be conservative estimates of the "true" values. We have followed the method of analysis used by Kogan and Wallach (1964). (For further explanation of the moderator variable technique see Kogan and Wallach, 1964, pp. 32-37.)

CHAPTER IV

RESULTS AND DISCUSSION

Having described the subjects and procedures used for studying the areas of creativity and risk taking, we turn now to a consideration of the findings.

From Lawrence Township we had 115 subjects and from Montgomery Township 47 subjects. There were no differences in means and standard deviations between these two groups, therefore we combined them and continued the analysis with two groups separated on the basis of sex only, 84 boys and 78 girls. Appendix C provides the correlation matrices for the total male and female samples.

First, we shall discuss the reliabilities of the assessment instruments and then proceed to examine their interrelationships.

1. Reliability of the Various Measures

Reliability of the Creativity Instruments

We calculated the reliability of each creativity measure from the odd-even reliability coefficient by means of the Spearman-Brown prophecy formula. We found that for the two creativity measures, reliability coefficients were substantial. For boys (N = 84) the Alternate Uses reliability coefficient was .94 and the Pattern Meanings reliability coefficient was .91. For girls (N = 78) the reliability coefficients were similar: Alternate

Uses .90 and Pattern Meanings .94. These results replicate the findings of Wallach and Kogan (1965, p. 41), who reported Spearman-Brown split-half reliability coefficients of .93 for Alternate Uses and .93 for Pattern Meanings (N = 151). Clearly the creativity procedures contained a high degree of internal consistency.

Reliability of the Risk Taking Instruments

Draw-a-Circle. For both boys and girls the test-retest correlation coefficient was .85. Therefore, it was evident that Draw-a-Circle was a highly reliable procedure.

Clues. For Clues the correlation between the two Clues tasks was .54 for boys and .44 for girls. These reliabilities were lower than those found by Worley (1960); .78 for a high incentive group and .71 for a low incentive group (N = 72). But the reliabilities were similar to those found by Kogan and Wallach (1964, Appendix C): .36 four adult males (N = 114) and .54 for adult females (N = 103).

Shuffleboard. The nature of this risk taking measure did not lend itself to the computation of reliability coefficients since it was a sequential procedure.

Reliability of the Intelligence Instrument

The California Short-Form Test of Mental Maturity is standard and widely used in testing programs, so considerable data are already available concerning its high reliability. The testing manual indicates that the intercorrelations between the measurements for the subtests are positive and usually range from .30 to .60.

Reliability of the Anxiety-Defensiveness Scales

Kuder-Richardson-20 reliabilities were calculated for defensiveness, anxiety, and test anxiety. They are listed in the following table.

TABLE 1

Reliability Coefficients for the Personality Variables

	Boys	Girls
Defensiveness	.59	.73
Anxiety	.81	.84
Test Anxiety	.82	.87

It can be seen that these scales are quite reliable and are similar to the reliabilities found by Wallach and Kogan (1965) and reported in the survey by Ruebush (1963).

2. Sex Differences on the Various Measures

Having established the reliability of the procedures, we are now in a position to consider the question: Were there sex differences evident on the various measures? Using the t test for the difference between independent means, we found that among 18 variables, 9 yielded significant differences between sexes. The latter are listed below:

TABLE 2

Variables Yielding a Significant Sex Difference for Total Male and Female Samples

Variable		Boys (N = 84)		Girls (N = 78)			
		Mean	SD	Mean	SD	t	p less than
Creativity,	Alt. Uses	30.08	21.97	24.17	11.84	2.10	.05
Shuffleb.	A. Exp	3.98	1.11	4.41	.93	-2.70	.01
	Ov. Ave.	4.64	1.60	5.28	1.56	-2.55	.02
	R. Shift	2.64	2.54	1.24	1.76	4.02	.001
	SC-Exp.	2.51	2.40	1.81	1.91	2.03	.05
	RC-Exp.	-.55	1.75	.15	1.74	-2.53	.02
Clues	TN	21.04	11.02	24.51	10.48	-2.04	.05
	Anxiety	5.89	4.01	9.18	4.68	-4.78	.001
	Test Anx.	5.99	4.02	8.00	4.81	-2.88	.01

See also Appendix D for complete data on sex comparisons.

Creativity. While there was no sex difference between the two groups on Pattern Meanings, there was a significant difference on Alternate Uses with boys generating more responses than girls. This finding of a higher level of creativity among boys appears to be consistent with the findings of Torrance (1963a) and Getzels and Jackons (1962). Indeed, most striking is the fact that the present findings were like those of Wallach and Kogan (1965, pp. 56-57), who found a significant sex difference in means on the creativity procedure administered first in a series and no sex difference on eight subsequent creativity procedures. They suggest that girls by virtue of their greater anxiety do not adapt as quickly to the experimental situation, hence their initially guarded attitude inhibits the associative, creative process. On the whole, however, the creativity of boys and girls in the Wallach and Kogan study was very much alike. While we administered only two creativity procedures, Alternate Uses which was given first revealed a sex difference in favor of boys. This is noteworthy because Alternate Uses is verbal in content, and girls are generally considered more verbal than boys.

Risk Taking. On the Shuffleboard procedure, both in terms of subjective evaluation and in actual performance, boys were greater risk-takers than girls despite the fact that there were no differences in number of successes. Boys also displayed a higher level of risk-taking on the Clues procedure, although once again number of successes was held constant. These results are relatively consistent with the work of Kass (1964) who found sex differences in favor of boys, in a 6-to-10-year-old age group, and with a study by Slovic (1966), who found sex differences in favor of boys in an 11 to 16-year-old age group. The 10 to 11-year-old group in this present study spanned the age ranges used in the foregoing studies. Boys were significantly higher also both in riskiest choice minus expectancy and in safest choice minus expectancy indicating that in general the boys in the sample showed greater variability than the girls.

Anxiety: As one might expect, there was a significant sex difference on anxiety with girls expressing higher levels of both general anxiety and test anxiety. These results are congruent with the findings in the vast literature on anxiety (e.g., Sarason *et al*, 1960; Ruebush, 1963). Within our culture a girl's femininity is not threatened by expressions of anxiety; on the other hand, we train boys to maintain "a stiff upper lip." It is interesting to note that there were no significant sex differences on defensiveness.

This correlational analysis also replicated the well-known finding that an inverse relationship exists between test anxiety and intelligence for both boys and girls.

TABLE 3

Correlations Between Intelligence and Test Anxiety

	Test Anxiety Boys	Girls
Lang. IQ.	-.21	-.32
Non-Lang. IQ.	-.20	-.36
Total IQ	-.25	-.38

An r of .22 is significant at .05 level; an r of .28 is significant at .01 level for boys and an r of .29 at the .01 level for girls.

3. Generality of the Various Measures

Creativity and Intelligance.

In considering creativity and intelligence, we earlier raised the question as to whether these procedures tapped two different dimensions of individual cognitive differences.

The intercorrelations between the two creativity tests were .75 ($p < .01$) for boys and .62 ($p < .01$) for girls. These correlations appeared to provide evidence for a unified dimension of individual differences that cuts across the verbal (Alternate Uses) and visual (Pattern Meanings) areas. Standard scores were computed for each of the creativity procedures and combined to yield a total creativity score. For the remainder of the study, therefore, we shall deal with a composite creativity score.

The intercorrelations between the total language and the total non-language subtests of the intelligence measure were .44 ($p < .01$) for boys and .60 ($p < .01$) for girls. These correlations seemed to provide evidence for a general dimension of intelligence that cuts across verbal concepts, spatial relations, logical reasoning, and numerical reasoning. Hence in subsequent discussions, we shall deal with the total IQ score.

In contrast, the correlations among the creativity and intelligence tests ranged from -.03 to .14 and were not statistically significant. It was clear that the creativity and intelligence measures were relatively independent of each other. These measurements replicated and indeed confirmed the conclusions of Wallach and Kogan (1965, pp. 54-58), who found that there are separate cognitive dimensions of creativity and intelligence and that the correlational patterns are highly similar for both sexes. In the present study the intercorrelations between the two creativity tests were higher than those found by Wallach and Kogan, while the correlations between the creativity and intelligence measures were even lower. Since the present sample was somewhat more heterogeneous than the sample described by Wallach and Kogan, it suggests that the distinction between creativity and intelligence can be generalized to a broader segment of the elementary-school population.

Risk Taking. While the correlational analysis demonstrated the reliability of Draw-a-Circle and Clues, it also suggested that the construct of risk taking is not undimensional. Intercorrelations among the risk-taking procedures ranged from -.08 to .08 for boys and .10 to .14 for girls. These correlations were not significant. Therefore, we continued the analysis carrying along all three of the risk-taking measures. It was quite conceivable that any one of the three measures could have a relationship with creativity.

4. Creativity, Intelligence, and Risk Taking

Having discussed the reliability and generality of the instruments, we proceed to an examination of their interrelationships. Note that the hypothesis of a positive relationship between creativity and risk taking logically warrants the use of a one-tailed test of significance. Inspection of the relevant correlation matrices indicated that creativity, and not intelligence, was related to certain risk-taking variables in boys. Table 4 presents the relevant findings.

TABLE 4

Correlations Between Creativity, Intelligence, and Risk Taking for Boys (N = 84)

	Risk Taking				
	Shuffleboard			Clues	Draw-a-Circle
	Ave. Exp.	Ov. Ave.	RC-Exp.	TN	RT
Creativity Composite Score	-.24	-.18	.01	.11	.02
Intelligence Total IQ	.10	-.11	-.09	-.03	.09

An r of .18 is significant for boys and an r of .19 is significant for girls at the .05 level for a one-tailed test of significance.

This relationship between creativity and risk taking in boys was evident in the scores for average expectancy and overall average on the Shuffleboard procedure. Recall that average expectancy is the average of two estimates of how close together the subject thinks he can have the markers and still get the penny between without touching them. The smaller the score, the greater the degree of risk taking it reflects. This average expectancy score may be thought of as an index of confidence. With boys, therefore, risk taking appeared to be operant even prior to actual performance and then continued throughout the Shuffleboard game as seen from overall average, the average of distance between the two Shuffleboard markers on the 20 trials allowed in the game. While the expectancy measure has implications for risk taking, it is not directly risk taking in a behavioral sense as we find in the overall average. The difference here is the difference between what one will do verbally and what one will actually do in a situation where there are clearly success or failure possibilities.

For girls creativity was related to certain risk taking variables in the Shuffleboard procedure. Table 5 presents the relevant findings. (See Appendix C for complete data on boys and girls.)

TABLE 5

Correlations Between Creativity, Intelligence, and Risk Taking for Girls (N = 78)

Risk Taking

	Shuffleboard			Clues	Draw-a-Circle
	Ave. Exp.	Ov. Ave.	RC-Exp.	TN	RT
Creativity Composite Score	.11	-.20	-.23	.02	-.04
Intelligence Total IQ	-.09	-.12	.05	-.24	.17

An r of .18 is significant for boys and an r of .19 is significant for girls at the .05 level for one-tailed test of significance.

As with boys, the relationship between creativity and risk taking was evident in the score for overall average. In addition, among girls the relationship was evident in the score for riskiest choice minus expectancy, which is the difference between the average expectancy and the smallest or riskiest distance between markers chosen by each subject. Boys, in contrast to girls, seemed to approach the Shuffleboard game with greater confidence or boldness, while girls seemed to develop a riskier orientation as they actually played the game and had successful experiences.

There were no significant relationships between creativity and the risk taking procedures Clues and Draw-a-Circle. However, as we consider the three risk-taking measures, it is very doubtful that Draw-a-Circle can be a valid measure of risk taking. During the process of gathering data, it became apparent from the remarks of the subjects that some children felt they were minimizing the risk by making an extremely large circle, while others felt they had a safer, easier task making a very small circle usually in one corner of the paper. Draw-a-Circle, therefore, cannot be used as a substitute for ring toss, one of the original Lewinian level of aspiration tasks. Although we were doubtful initially as to the value of Draw-a-Circle as a measure of risk taking, it took so little time to administer that we felt it only fair to refrain from skepticism until we had some empirical basis for judgment. The findings lead us to conclude that McClelland's assumptions about Draw-a-Circle as a risk taking measure are not justified. While The Achieving Society may be a highly provocative study, its lack of significant empirical results may be due in part to the lack of precision in the measuring instruments.

The lack of relationship between creativity and Clues seemed to have greater complexity. Among girls there was a significant negative relationship ($r = -.24$, $p < .05$) between intelligence and total number of clues desired before naming the two objects. Girls with more intelligence sought fewer clues before venturing to guess in the Clues task. Hence, it would appear that among girls, verbal ability was a common element in both the intelligence test and in Clues which is a verbal risk-taking procedure. This relationship did not exist for boys ($r = -.08$). As we evaluated the three risk-taking procedures, it appeared that Shuffleboard provided the best measure of risk taking. We had reason to doubt the validity of Draw-a-Circle, and Clues appeared to be overly saturated with verbal content. From the point of view of elementary school children, the Clues task had many of the same elements found in classroom learning. While a monetary incentive was offered in Clues, one might question to what extent this incentive could outbalance the evaluative connotation of a chore involving verbal skills. On the other hand, intrinsic satisfaction with success in a task quite remote from classroom learning was the sole incentive in the Shuffleboard game. If one can judge by degree of task involvement, Shuffleboard was the most successful risk-taking procedure. Recall that each child, at the conclusion of the individual testing, was asked to vote for his first and second favorite choices among the "games" he had played. Overwhelmingly, the subjects chose Shuffleboard.

As we further considered the relationship between creativity and risk taking, it became evident that the high degree of relationship between risk taking and success might be contaminating the correlation between creativity and risk taking. Therefore, using the formula for part correlation as described by McNemar (1962, p. 167), we calculated the correlation between creativity and risk taking with success partialled out of risk taking. In this calculation, and in subsequent analyses, the risk taking score of overall average was used because it appeared to provide the best single measurement of risk taking. The relationship between creativity and risk taking, which was significant before success was partialled out ($r = -.18$, $p = .05$) became even more significant for boys when success was removed ($r = -.24$, $p = .02$). It was not significant for the total sample of girls ($r = -.15$).

Although we had found that creativity and intelligence were relatively independent of each other (boys, $r = .11$; girls, $r = .01$), we continued with a part correlational analysis in order to determine what role intelligence might play in the relationship between creativity and risk taking. Part correlations were calculated for the total samples of boys and girls (1) between creativity and risk taking with intelligence partialled out of creativity and success partialled out of risk taking (r_1), and (2) between intelligence and risk taking with creativity partialled out of intelligence and success partialled out of risk taking (r_2)[1]. We found that for boys a significant relationship still remained between creativity and risk taking even with intelligence partialled out ($r_1 = -.22$ as compared to $-.24$ without intelligence removed); for girls there was no significant relationship ($r_1 = -.15$).

On the other hand, when intelligence was correlated with risk taking and creativity was partialled out of intelligence and success was partialled out of risk taking, there was also a near-significant relationship between intelligence and risk taking for

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[1] M. Browne of Educational Testing Service (Princeton, N. J., Aug., 1966) derived the following formula for part correlation between x_1 (x_3 partialled out) and x_2 (x_4 partialled out):

$$r_{12} = \frac{r_{12} - r_{13}r_{23} - r_{14}r_{24} + r_{13}r_{24}r_{34}}{\sqrt{(1 - r_{13}^2)(1 - r_{24}^2)}}$$

variables	variables
1 - creativity	1 - intelligence
2 - ov. ave. (risk taking)	2 - ov. ave.
3 - intelligence	3 - creativity
4 - success	4 - success

boys ($r_2 = -.20$ $p < .10$) but not for girls ($r_2 = -.04$). Hence, in boys risk taking was found to be a function of both intelligence and creativity, though the latter variable seemed to exert a somewhat greater influence. This suggests that the relationship between creativity and risk taking would be most pronounced in that group which combined high creativity and intelligence.

Let us consider once more the relationships between creativity and average expectancy, and intelligence and average expectancy. In boys there was a significant relationship between creativity and average expectancy (an index of self confidence), while intelligence and average expectancy were relatively independent. Hence creative boys engaged themselves in the Shuffleboard game with a greater initial boldness than other groups. During actual performance on Shuffleboard, intelligence, as well as creativity, is related to risk taking; therefore, we suggest the following interpretation. Creativity influenced risk taking in terms of initial expectancy for boys. As feedback occurred during actual performance, intelligence as well as creativity exerted a significant influence on risk taking behavior.

5. Anxiety, Test Anxiety, and Defensiveness in Relation to Creativity and Risk Taking.

While we found a positive relationship between creativity and risk taking in the total sample of boys, this relationship did not hold for the total sample of girls when success was partialled out. We then attempted to resolve the following question: Was it possible that negligible relationships in the total sample might mask stronger relationships between creativity and risk taking in subgroups when anxiety, test anxiety, and defensiveness were introduced as moderators? Remember that moderator variables are used to focus attention on the kinds of differences that exist among individuals who in some given respect are homogeneous. With regard to the domain of thinking, the motivational or personality variables of anxiety, test anxiety, and defensiveness appeared to have a critical influence in previous research. Hence by focusing on variables that had demonstrated their influence on thinking in prior investigations, we hope that this present effort will have continuity with previous work in the field.

In this study defensiveness in boys was independent of both anxiety (r = .02) and test anxiety (r = .06). This finding seems congruent with theoretical expectation, since a child may have either a predominantly overt or a repressed style of coping with anxiety. For some individuals, the drives and conflicts are so strong and/or the defenses are so weak that the individual frequently experiences a state of anxiety. For others, anxiety exercises a "signal function"; defenses are invoked at the first sign of impending danger. Such persons would rarely experience anxiety since their defenses serve the protective function of keeping repressed material out of consciousness. A child whose defense system is rigid and inflexible may use defenses which interfere with other behavioral processes, whereas a child who has acquired a variety of defenses may have more flexibility in meeting threatening situations. (Ruebush, 1963).

In girls, however, defensiveness was significantly related to both anxiety (r = .23) and test anxiety (r = .32). If one accepts the view that defensive children have a strong disposition toward anxiety which is kept in check by a powerful set of defenses, one might expect anxious and defensive children to share certain common personality components. These commonalities at the level of deeper needs and motives would set them apart from less disturbed children. In our culture where it is acceptable for girls to more openly express anxieties, the defensive girl may more frequently than an equally defensive boy allow anxieties to break into consciousness. In this study, therefore, we found greater independence among personality variables for boys than for girls. But the correlational patterns and reliabilities of the scales for anxiety, test anxiety, and defensiveness were similar for both boys and girls.

There was a significant relationship between test anxiety and anxiety for both boys (r = .48) and girls (r = .46), a result in accord with previously published evidence (Sarason et al, 1960; Wallach and Kogan, 1965). Children who expressed overt anxiety as a general personality characteristic were also likely to express anxiety in a more specific anxiety-laden situation--test-taking in school. Here anxiety was focused upon a particular type of life stress. However, the correlations between anxiety and test anxiety, were not so high, relative to the reliabilities of the respective scales, as to suggest that the two forms of anxiety were reducible to one.

Anxiety, test anxiety, and defensiveness were used to subdivide the samples of boys and girls prior to correlating creativity and risk taking. Each subject was then classified as high or low on each of the foregoing three moderators. Tables 6 and 7 present the relevant findings. (Descriptive data for a two-way moderator split are contained in Appendix E)[2]. In the tables, the correlations are listed for the moderators taken singly. The z values listed are the normal deviate statistic indicating the significance of the difference in correlations between high and low subgroups on each moderator.

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[2] When two moderators are treated simultaneously, a fourfold classification of subjects is involved. In the 16 subgroups so divided, 7 subgroups contained fewer than 20 cases. With the frequency of cases so small in almost half of the subgroups, there seemed little possibility for gaining further useful information from a more extensive analysis.

TABLE 6

Comparison of Part Correlations Between Creativity (Intelligence Partialled Out) and Risk Taking (Success Partialled Out) for Moderator Subgroups of Males

	Anxiety		Test Anxiety		Defensiveness	
	Low	High	Low	High	Low	High
N	45	39	43	41	38	46
r	-.21	-.24	-.12	-.33*	-.37*	-.00
z	.11		.96		-1.68	
p	n. s.		n. s.		.05	

For all correlation coefficients reported in the tables, one asterisk indicates $p < .03$ for a one-tailed test of significance.

TABLE 7

Comparison of Part Correlations Between Creativity (Intelligence Partialled Out) and Risk Taking (Success Partialled out) for Moderator Subgroups of Females

	Anxiety		Test Anxiety		Defensiveness	
	Low	High	Low	High	Low	High
N	36	42	39	39	34	44
r	-.22	-.13	-.14	.12	-.13	-.07
z	-.39		-.11		-.26	
p	n. s.		n. s.		n. s.	

Inspection of Table 6 reveals that defensiveness was the critical personality variable for boys that moderated the relationship between creativity and risk taking when intelligence was removed from creativity and success from risk taking. Table 7 shows that this relationship was not significant for girls. From Table 6 it is evident that for boys there is a significant difference in correlations between high and low defensiveness. Low defensiveness enhances the relationship between creativity and risk taking; high defensiveness inhibits that relationship. We also find a significant relationship between creativity and risk taking in the presence of high test anxiety, but there is no significant difference in correlations between high and low test anxiety. Consequently, we conclude that defensiveness, and not test anxiety is the critical moderator.

The findings are consistent with previous studies on defensiveness and test anxiety (Ruebush, Byrum, and Farnham, 1963; Wallach and Kogan, 1965; and Zimbardo, Bernard, and Berkowitz, 1963). Where a situation is highly unstructured and unfamiliar, defensive boys are likely to be at a disadvantage. Our testing situation was relaxed and gamelike. The creativity measures were somewhat ambiguous and the risk-taking procedures required decisions in an uncertain situation. These conditions are threatening to the defensive boy whose energy is consumed in image maintenance so that little remains for evaluating the requirements of the specific task under consideration. Generally, the highly defensive child is so involved with his own image within his own self-evaluation system and so sensitive to his image in the eyes of others that he cannot function freely within the context of the particular task.

On the other hand, there is evidence that high test anxiety, which involves scanning the environment in terms of success or failure potentials, may either interfere with or facilitate performance depending upon certain predictable task and situational variables (e.g., Lighthall, Ruebush, Sarason, and Zweibelson, 1959; Wallach and Kogan, 1965). Where the testing condition is relaxed, game-like, and non-evaluative, high test anxiety may have a facilitating effect. Indeed, overtly acknowledged anxiety under the stress of evaluative school situations interferes with performance on intelligence tests but does not especially inhibit creativity (Wallach and Kogan, 1965). We are led to suggest, therefore, that it is the specific quality of the motivational disturbance, as well as the degree, that influences the relationship between creativity and risk taking in boys. High defensiveness attenuates the relationship probably by interfering with risk taking.

On the Shuffleboard procedure, the defensive child is confronted not only with the requirements of the game but also with his need for the approval of the examiner. If one is willing to conceive of defensiveness as also reflecting a "need for social approval" (Crowne and Marlowe, 1964), then the defensive child is one for whom failure may imply social alienation and rejection. The rules of the Shuffleboard game do not tell him what the examiner values--success or boldness. The defensive child, therefore, is confronted with multiple possibilities in a situation that is essentially uncertain. He responds more in terms of his own motivational needs than in terms of the task as he undertakes the risk-taking procedure. Hence one sees a dip in the correlation between creativity and risk taking. In contrast, the performance of the low defensive child reflects the requirements of the task; motivational disruption is minimal. Under these conditions we see the expression of creativity and risk taking in its purest form, and the correlation emerges most strikingly.

Having examined the role of moderators in the relationship between creativity and risk taking when intelligence was removed from creativity and success from risk taking, it was conceivable that the same moderators--anxiety, test anxiety and defensiveness--would influence the relationship between intelligence and risk taking. Tables 8 and 9 present the relevant findings.

TABLE 8

Comparison of Part Correlations Between Intelligence (Creativity Partialled Out) and Risk Taking (Success Partialled Out) for Moderator Subgroups of Males

	Anxiety		Test Anxiety		Defensiveness	
	Low	High	Low	High	Low	High
N	45	39	43	41	38	46
r	-.25	-.12	-.09	-.20	-.17	-.26
z	-.57		.51		.38	
p	n. s.		n. s.		n. s.	

TABLE 9

Comparison of Part Correlations Between Intelligence (Creativity Partialled Out) and Risk Taking (Success Partialled Out) for Moderator Subgroups of Females

	Anxiety		Test Anxiety		Defensiveness	
	Low	High	Low	High	Low	High
N	36	42	39	39	34	44
r	-.11	.04	.13	-.20	.06	-.18
z	-.62		1.42		.99	
p	n. s.		n. s.		n. s.	

When the moderator split was made with creativity partialled out of intelligence and success partialled out of risk taking, there were no significant relationships between intelligence and risk taking for either boys or girls. The findings in Tables 8 and 9 provide further evidence to support the view that creativity bears a more powerful relationship to risk taking than does intelligence.

CHAPTER V

CONCLUSIONS AND IMPLICATIONS

An Overview of the Findings

The findings reported in this study have made the following contribution to knowledge about thinking and personality. For the first time a hypothesis concerning creativity and risk taking has been put to empirical test in a sample of children, and it has been found that for boys a positive relationship exists between creativity and risk taking. We have constructed a bridge across the gap separating two extensive areas of psychological research, creativity and risk taking. Whether the relationship between creativity and risk taking in fifth-grade boys remains stable up and down the age scale must remain an open question pending the systematic collection of relevant longitudinal data.

The present results have confirmed the validity of a cognitive distinction between creativity and intelligence in an elementary-school sample found by Wallach and Kogan (1965). While Wallach and Kogan used ten creativity variables and ten intelligence variables, we were able to demonstrate the relative independence of creativity and intelligence using two of the ten creativity variables from the Wallach and Kogan battery and three intelligence variables. Furthermore, creativity and intelligence in the present study exerted a combined effect on risk taking. Creativity, however, exerted a somewhat greater influence.

The foregoing relationships enhance our awareness of the complexity of the entire domain of thinking.

It is well known that thinking can be influenced by personality or motivational factors. The value of the moderator analysis in this study was to clarify the role of various personality components contributing in boys to the relationship between creativity and risk taking. Low defensiveness enhanced that relationship, and high defensiveness attentuated it. The present data are consistent with prior research indicating that defensiveness has important implications for thinking in boys. This analysis also replicated the findings of Sarason _et_ _al_ (1960) and others (see Ruebush, 1963) that intelligence is inversely related to test anxiety in boys and girls.

The lack of relationship between creativity and risk taking for girls is puzzling. We are led to conclude with Torrance, Getzels and Jackson, and Wallach and Kogan that girls at an earlier age than boys learn to conform to the cultural restrictions of society. In general they are less variable and more sedate. The most effective risk-taking procedure in this study, Shuffleboard, was a motor skill task. Conceivably, this task was more appealing to boys. If girls viewed this game as a "boy's" game, possibly they were not involved enough to set in action those very motivational variables we were attempting to measure.

Implications for Theory

To what extent do the findings in this study support the speculations in the literature that creative people are more willing to take risks than less creative people? Barron, Kaplan, Bruner, and Getzels and Jackson (see Ch. I) in describing the creative individual stressed a quality of self confidence. Kaplan and Bruner thought of this self confidence in terms of tackling external problems; e.g., making an intuitive leap into the unknown and opening new intellectual pathways. Barron and Getzels and Jackson stressed the self confidence of the creative person in confronting his own internal world, confronting the fantasies and impulses within himself knowing that his ego is strong enough to regress and then correct itself at will. What evidence does the present study offer to support the picture of the creative individual as having the self confidence or courage to risk making both external decisions where there are many unknowns and internal accommodations that involve confronting anxieties and coping with them?

In this study we have presented evidence to support the hypothesis that a positive relationship exists between creativity and risk taking. While the foregoing speculations have been limited to adults and, in one instance, adolescents, it is remarkable that we should have found this relationship in fifth-grade boys. Furthermore, it has been shown that this relationship is most striking in the absence of motivational disturbance. Where defensiveness is low, the relationship is most apparent.

The findings in this study raise the following implications for an approach to the study of thinking. A wide variety of processes can be included under the general rubric of "thinking" for example, one finds discussions of problem solving, concept attainment, imagination, creative thinking and decision-making processes. Each area is generally studied separately. While it is well known that thinking can be influenced by motivational determinants in manifold ways, studies of personality also have generally been conducted separately from studies of cognitive processes. There has been a tendency in the past toward a distinct separation between fields that can be shown to contain common elements. On the other hand, the work of Wallach and Kogan (1965) on intelligence and creativity is an example of the kind of fruitful outcome one may anticipate from bringing into focus on a problem significant elements from separate fields. In their study intelligence and creativity were brought into contact with the work on cognitive controls and conceptual styles in children.

In the present study, we have brought simultaneously creativity, intelligence, and risk taking (decision making) within the scope of a single investigation. All three of these dimensions of intellect may be considered cognitive categories. By treating them simultaneously, we believe it has been possible to attain a level of clarity with regard to relationships between them that has not been achieved by considering any one of these cognitive dimensions separately. Evidence in the present study made it clear that the relationship between creativity and risk taking was dependent upon unique motivational correlates. Therefore, the importance of the present study lies in its treating the interfaces between the domains of creativity and risk taking and intelligence.

Implications for Education

While a major concern of education today is to find and encourage the development of all potentially creative individuals, there are various inhibiting factors that militate against creative growth. Among these factors is the success orientation in our schools that prepares children only for success, not for coping with frustration or failure. The very concept of readiness is built on the premise that all children must follow a set pattern, otherwise they may be frustrated by failure. The highly defensive and conforming child who bends his efforts toward building an image that will meet the teacher's approval and will lead to the goal of academic success is likely to find the classroom a comfortable place. By using only a portion of his cognitive skills, those generally associated with "convergent" thinking, the child can generally be successful.

But it is not within a context of emphasis on success or conformity in thinking and personality patterns, that creativity is likely to emerge. We have found a relationship between creativity and risk taking in boys, particularly among those who are low in defensiveness. These children who are not concerned with image maintenance are likely to display personality characteristics that make them particularly vulnerable in an atmosphere that stresses the evaluative aspects of success and failure. Their very openness to the environment, their capacity to express feelings of anxiety, their willingness to take a chance either in guessing or in expressing divergent thoughts may be suppressed. And by forcing them to repress these motivational or personality characteristics, the teacher may also be repressing the possibility for creativity.

Herbart has said, "One must take risks with boys" (quoted in Torrance, 1964, p. 99). Herbart argued that children must be allowed to experience natural crises, blind alleys, and other threatening situations. Only when the child cannot find his own way out should teachers find ways of helping him. Very often in life we are forced to guess or to make decisions on the basis of incomplete information. Bruner (1961) has emphasized the value of the intuitive guess as one necessary aspect of creative thinking. We are in accord with Torrance (1964) who suggests that it may be more important to experiment with what risks need to be taken than at what age most children can cope with a task.

To foster conditions in the classroom that will allow creativity, as well as other cognitive abilities, to emerge more fully, we suggest the need for a psychologically safe environment. This would include a decline in testing and continual evaluation, the encouragement of "divergent" thinking and a more relaxed and gamelike atmosphere. Children should be encouraged to toy with a variety of ideas and to guess even at the risk of being wrong. We propose that learning can take place through failure as well as success providing the teacher allows an atmosphere which permits failure without condemnation and the right to try a different course of action. A youngster who is insecure and lacks confidence cannot take risks; he is too preoccupied with building emotional defenses.

We conclude with an example of creative thinking that points up the necessity for allowing expression of "divergent" thinking, the intuitive guess, and low defensiveness. R. P. Feynman, Nobel laureate in physics, describes his thinking during the development of the space-time view of quantum electrodynamics (1966, p. 44):

> The fact that electrodynamics can be written in so many ways . . . . was something I knew, but I have never understood. It always seems odd to me that the fundamental laws of physics, when discovered, can appear in so many different forms that are not apparently identical at first but with a little mathematical fiddling you can show the relationship, . . . I don't know why this is -- it remains a mystery, but it was something I learned from experience. There is always another way to say the same thing that doesn't look at all like the way you said it before. I don't know what the reason for it is. I think it is somehow a representation of the simplicity of nature. . . . I don't know what it means, that nature chooses these curious forms, but maybe that is a way of defining simplicity. Perhaps a thing is simple if you can describe it fully in several different ways without immediately knowing you are describing the

same thing (p. 36). . . . I think equation guessing might be the best method for proceeding to obtain the laws for the part of physics which is presently unknown . . ., but it is very easy to go off in wildly incorrect and impossible directions. I think the problem is not to find the best or most efficient method for proceeding to a discovery, but to find any method at all. . . . in the search for new laws, you always have the psychological excitement of feeling that possibly nobody has yet thought of the crazy possibility you are looking at right now (p. 44).

APPENDIX A

Scores on Group Administration of Draw a Circle for 21 Fourth-Graders (12 boys - 9 girls)

Subject	Score 1	Score 2	Ave. (Meas. in cm.)
M1	7.9	8.2	8.1
M2	3.5	5.8	4.7
M3	6.7	7.5	7.1
M4	7.0	6.0	6.5
M5	5.4	5.1	5.3
M6	12.1	14.8	13.5
M7	6.0	6.4	6.2
M8	6.3	5.8	6.1
M9	9.4	13.5	11.5
M10	8.7	6.7	7.7
M11	5.7	4.3	5.0
M12	6.3	8.6	7.5
F13	8.9	10.5	9.7
F14	6.7	5.9	6.3
F15	2.4	5.9	4.2
F16	5.7	6.8	6.3
F17	8.3	9.0	8.7
F18	11.1	11.4	11.3
F19	6.3	7.4	6.9
F20	77.1	5.6	6.4
F21	8.9	9.2	9.1

Ave. girls = 7.7

Ave. boys = 6.7

Total ave. = 7.1

Total median = 6.9

APPENDIX B

Scores on Individual Administration of Clues for 30 Fifth-Graders (18 boys, 12 girls)

Subject	Teacher Estimate of Academic Rank (Highest = 1)	Clues (1) Goat	Clues (2) Bat	Ave.
M1	1	6	5	5.5
M2	3	12	9	10.5
M3	1	6	6	6
M4	3	4	5	4.5
M5	3	8	5	6.5
M6	1	12	+9	10.5
M7	2	12	5	8.5
M8	1	7	20	13.5
M9	3	11	9	10
M10	2	14	+23	18.5
M11	1	12	9	10.5
M12	2	4	5	4.5
M13	2	10	18	14
M14	3	7	+9	8
M15	1	7	10	8.5
M16	3	23	23	23
M17	2	15	17	16
M18	1	3	6	4.5
Ave.		9.6	10.7	
F1	2	+21	+14	17.5
F2	2	11	7	9
F3	2	9	18	13.5
F4	1	3	18	10.5
F5	3	23	+19	21
F6	2	13	14	13.5
F7	1	+21	+14	17.5
F8	1	8	+15	11.5
F9	3	23	23	23
F10	2	9	14	11.5
F11	3	8	+21	14.5
F12	1	5	14	9.5
Ave.		12.8	15.9	

APPENDIX C

Intercorrelations of Major Variables for Total Male (N = 84)
and Total Female (N = 78) Samples

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	Lang IQ		.44	.87	.14	.11	.14	.12	-.03	-.07	-.02	.06	-.13	-.04	-.08	-.10	-.16	-.23	.06	-.09	-.01	-.21
2	Non-Lang IQ	.60		.82	.02	.02	.02	.04	-.16	.20	.09	.05	-.07	-.13	.02	.11	-.13	-.07	.10	-.17	-.08	-.21
3	Total IQ	.89	.89		.11	.09	.11	.10	-.11	.07	.04	.07	-.13	-.09	-.03	.00	-.17	-.19	.09	-.16	-.05	-.25
4	Pattern M.	-.03	-.03	-.03		.75	.94	-.23	-.11	.06	-.05	.02	-.00	.05	.11	-.09	.14	.08	.01	-.13	-.14	.00
5	Alternate U.	.03	.06	.05	.62		.94	-.21	-.22	-.06	-.08	-.03	-.10	-.03	.09	-.02	.08	.01	.02	-.16	-.19	-.05
6	Total Creat.	.00	.02	.01	.90	.90		-.24	-.18	.00	-.07	-.01	-.05	.01	.11	-.06	.12	.05	.02	-.16	-.17	-.02
7	Ave. Exp.	-.10	-.07	-.09	.12	.07	.11		.27	-.12	-.20	.27	-.44	-.27	.08	.06	-.01	-.08	-.07	-.07	.28	.22
8	Ov. Ave.	-.04	-.17	-.12	-.15	-.20	-.20	.29		-.03	-.10	.70	.40	.62	.07	-.06	-.03	-.08	.01	.03	.13	.14
9	Con. Shft.	-.25	-.21	-.25	.03	.01	.02	-.11	-.14		.62	.09	.31	-.21	.10	-.03	-.03	-.05	.02	-.03	.10	.04
10	R. Shft.	-.05	.01	-.01	.11	.09	.11	-.18	-.30	.54		.02	.59	-.44	.02	.00	.00	-.00	-.00	-.06	.20	.12
11	Success	-.07	-.15	-.13	-.18	-.06	-.13	.17	.65	-.19	-.22		.34	.31	.19	-.03	-.06	-.20	-.06	-.01	.07	.11
12	SC-Exp.	-.12	-.22	-.19	-.12	-.20	-.18	-.35	.51	.23	.38	.28		.22	-.00	-.07	-.03	-.02	.04	.08	.01	.03
13	RC-Exp.	.12	-.02	.05	-.22	-.19	-.23	-.20	.74	-.35	-.51	.54	.34		-.10	-.08	-.08	-.04	.11	.09	-.18	-.13
14	Clues TN	-.26	-.15	-.24	.03	.03	.02	.14	.10	-.14	-.22	.08	-.05	.06		.63	-.07	-.08	-.05	-.14	.02	-.05
15	Clues CT	-.24	-.09	-.20	.18	.12	.17	.13	.04	-.12	-.13	.07	-.04	.06	.66		-.18	-.05	.10	-.18	.09	-.11
16	DC LT	-.27	-.27	-.30	.11	-.15	-.02	-.11	.14	.18	.09	-.14	.28	.05	.08	.05		.64	-.56	.02	.25	.25
17	DC DT	-.08	-.22	-.17	.15	-.08	.04	-.11	.24	.01	.03	-.01	.31	.21	.11	-.04	.47		.05	-.01	.04	.04
18	DC RT	.23	.07	.17	-.06	.00	-.04	.02	.06	-.14	-.09	.07	-.05	.10	.06	.03	-.55	.23		-.00	-.22	-.14
19	Defn.	-.16	-.20	-.20	.08	.10	.10	-.07	-.12	.19	-.04	-.14	.02	-.16	.24	.13	-.06	-.02	.15		.02	.06
20	Anx.	-.20	-.16	-.20	.04	.14	.10	.10	-.02	.23	.13	-.12	.05	-.16	.19	.22	-.03	-.16	-.05	.23		.48
21	T. Anx.	-.32	-.36	-.38	-.06	-.02	-.04	.18	.00	.10	.03	-.06	.05	-.19	.14	.11	-.08	-.29	-.07	.32	.46	

Note: Correlations for males are above the diagonal and those for females are below.

APPENDIX D

Sex Comparisons on the Major Variables for Total Male and Female Samples

	Males (N = 84)		Females (N = 78)		
Variable	Mean	SD	Mean	SD	t
Intelligence Variable					
1. Lang. IQ	116.27	11.83	118.08	9.73	-1.05
2. Non-Lang. IQ	113.90	13.08	113.42	12.27	.24
3. Total IQ	116.08	11.39	117.04	10.34	-.55
Creativity Variables					
4. Pattern Meanings	32.23	14.97	32.44	16.04	-.09
5. Alternate Uses	30.08	21.97	24.17	11.84	2.10
Risk-Taking Variables					
Shuffleboard					
6. Ave. Exp.	3.98	1.11	4.41	0.93	-2.70
7. Ov. Ave.	4.64	1.60	5.28	1.56	-2.55
8. C. Shft.	0.76	1.30	0.51	1.03	1.34
9. R. Shft.	2.64	2.54	1.24	1.76	4.02
10. Success	9.17	3.70	9.63	3.67	-.79
11. SC-Exp.	2.51	2.40	1.81	1.91	2.03
12. RC-Exp.	-0.55	1.75	0.15	1.74	-2.53
Clues					
13. CL TN	21.04	11.02	24.51	10.48	-2.04
14. CL CT	0.68	0.66	0.71	0.77	-.23
Draw-a-Circle					
15. DC LT	11.35	9.22	11.21	7.29	.11
16. DC DT	19.00	8.16	20.29	7.16	-1.06
17. DC RT	5.97	5.38	5.57	5.31	.48
Personality Variables					
18. Defn.	10.11	2.80	9.42	3.33	1.41
19. Anx.	5.89	4.01	9.18	4.68	-4.78
20. T Anx.	5.99	4.02	8.00	4.81	-2.88

For 160 df, t's of 1.97 and 2.61 are significant at the .05 and .01 levels, respectively.

APPENDIX E

Part Correlations for Males and Females for Two-way Moderator Subgroups

r_1 Between Creativity (Intelligence Partialled Out) and Risk Taking (Success Partialled Out)

r_2 Between Intelligence (Creativity Partialled Out) and Risk Taking (Success Partialled Out)

	Males			Females		
Variable	N	r_1	r_2	N	r_1	r_2
LA LD	21	-38*	-34	18	-26	-15
LA HD	24	-01	-24	18	02	-18
HA LD	17	-51*	10	16	-35	38
HA HD	22	19	-35	26	-15	-11
LTA LD	21	-30	-11	23	-01	24
LTA HD	22	-23	01	16	-17	-15
HTA LD	17	-41	-20	11	-37	-33
HTA HD	24	-17	-30	28	05	-19

Decimal points are omitted. The figures with an asterisk are significant at the .05 level or less for a one-tailed test of significance.

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